February

MODERN MECHANIX AND INVENTIONS

NOW 15¢

IN CANADA 20¢

NRA CODE

AERO-DRIVE DESERT LINER
SEE PAGE 79

Around the World on New Airways of the Seas

By Capt. Eddie Rickenbacker

$10,000.00 IN PRIZES FREE

WILL BE OFFERED

FIRST PRIZE
NEW 1935 PLYMOUTH
Wouldn't you be thrilled if you won this new 1935 coach? (Value in cash, if you prefer.) You may win—it's easy. Delivered fully paid to your door.
NOTHING TO BUY—NOTHING TO SELL—TO WIN THIS PRIZE.

SECOND PRIZE
G. E. ELECTRIC REFRIGERATOR. Your chance is as good as anyone's to win this beautiful, latest model family size, G. E. Refrigerator. (Value in cash if you prefer.)
NOTHING TO BUY—NOTHING TO SELL—TO WIN THIS PRIZE.

THIRD PRIZE
COLSON BICYCLE
Boy's or girl's, man's or lady's model—your choice. Fully equipped, with coaster brake, etc., etc. (Value in cash if you prefer.)
NOTHING TO BUY—NOTHING TO SELL—TO WIN THIS PRIZE.

HUNDREDS OF OTHER PRIZES will be offered FREE

"JUST COUNT DOTS ON SHOE

AND GIVE ONE OF BEST ANSWERS TO QUESTION 'WHAT IS SO-LO?'"

TO WIN ONE OF PRIZES ILLUSTRATED HERE

HOW MANY DOTS? SEE CLUE BELOW

HOW TO WIN

PRIZES SHOWN HERE

Honest Judges — See Paragraph 4

Easy, different, new kind of thrilling contest! Nothing to buy or sell to win any of 3 big prizes. Read how easy:

1. Count number of DOTS on shoe pictured here. Write number on Blank. (See IMPORTANT CLUE above the coupon.)
2. Answer Question: "What Is So-Lo?" Write answer in 25 words or less on separate piece of paper. Any answer about the economy feature, convenience, etc., of So-Lo, in your own words, may win — like: "World's lowest priced shoe repair," or "It's economical — just spread on like butter." (Note: Do not send the above answers—they are only examples.) Bad spelling won't count against you. Write in pencil, if you wish.
3. Prizes will be awarded primarily on the basis of the nearest correct number of dots; secondarily on the best answers (for advertising purposes) to the question, "What Is So-Lo." In event of ties for any prize, identical prizes will be awarded to tying contestants.
4. Entries will be judged by impartial committee: Miss Mary Marshall, Home Economics Editor, Tower Magazines; Miss Marjorie Deen, Home Economics Editor, Modern Magazines; E. H. Brown, President, E. H. Brown Advertising Agency, Chicago. Judges' decisions will be final.
5. All entries must be postmarked before midnight, February 28, 1935. Prize winners will be notified shortly after close of contest.
6. So-Lo Works employees or their relatives not eligible to enter. Only 1 entry to a family.

This offer WILL NOT appear again. ACT NOW — *Mail Entry Coupon!*

EASY!

ANYBODY MAY WIN

YOU may be the one to receive a telegram announcing that you've won the 1935 Plymouth! Send in the Entry Blank now. No tricks, no "schemes," nothing to buy or sell, no other puzzles to solve, absolutely nothing else to do to win prizes shown here. Money to buy these 3 big prizes is deposited in biggest Cincinnati bank now. Your chance to win as good as anybody's. Hundreds of other big, valuable, surprize prizes will be offered FREE OF CHARGE. Entry blank brings all sensational details. Act now!

WHAT IS So-Lo?

So-Lo, the amazing plastic, mends the Sole or Heel, 1c a repair! Spreads on half-soles as low as 8c a pair. *Easy—just dig out a chunk of So-Lo and spread on sole like butter on bread.* Dries hard, tough, and smooth—waterproof, flexible, non-skid. Guaranteed to outwear ordinary leather or rubber. One kit can save as much as $6.00 to $25.00. Over 5,000,000 families now use So-Lo to fix cuts in tires, holes in auto tops, hot water bottles, and over 247 other uses.

See So-Lo at WOOLWORTH'S, KRESGE'S, KRESS', W. T. GRANT'S, NEISNER'S, McCRORY'S, MURPHY'S, McLELLAN'S, WALGREEN'S, SCOTT'S, BEN FRANKLIN, MONTGOMERY WARD'S, SEARS ROEBUCK'S, 5 AND 10c STORES, OR HARDWARE STORES.

Also at Newberry's and Green's

SO-LO WORKS

World's Largest Makers of Money-Savers

CINCINNATI, OHIO

Important CLUE

TO NUMBER OF DOTS ON SHOE

Look at **Patent Number** on the box of So-Lo at any of the stores listed below, or at 5 and 10c stores, or hardware stores. To get within 25 of the correct number of dots on shoe shown here, multiply the first three numbers of the patent number by three. IMPROVE YOUR CHANCE TO WIN: See So-Lo box at your neighborhood store today.

$200.00 CASH EXTRA!

Nothing to buy or sell to win prizes shown here, BUT if you send in part of So-Lo box showing PATENT NUMBER (or facsimile thereof) with your entry, you will receive $200.00 CASH EXTRA IN ADDITION to Plymouth Auto if you are declared winner of First Prize. Hurry—don't wait. Rush your entry today.

SEND NO MONEY··MAIL THIS TODAY

PRIZE CONTEST ENTRY BLANK

SO-LO WORKS, "RED" Appleton, Contest Manager, Cincinnati, Ohio.

☐ Check here if sending in part of So-Lo box.

Dear "Red":—

I want to win the FREE 1935 PLYMOUTH AUTOMOBILE, the G. E. ELECTRIC REFRIGERATOR, or the COLSON BICYCLE. Here is my entry:

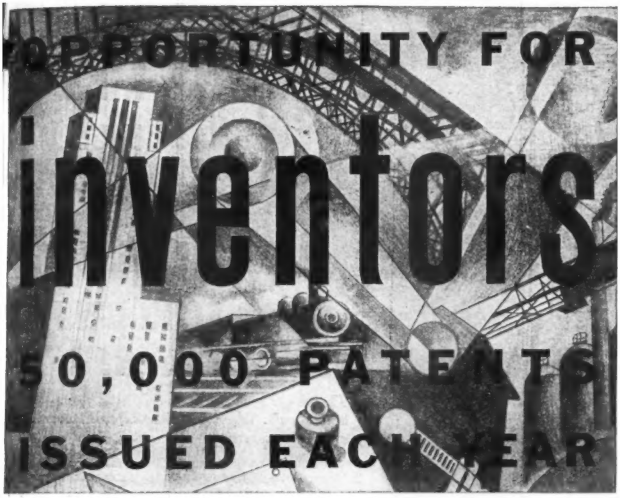
There are.....dots on the So-Lo Shoe. My answer to the question "What Is So-Lo?" in 25 words or less is written on attached piece of paper.

NAME .....

(Print Plainly. Use pencil if you prefer)

ADDRESS .....

TOWN ..... STATE.....MM



THERE'S profit and pleasure in inventions — and a great demand for them! But you need more than an inventive turn of mind — you need a foundation of practical knowledge so you can realize the real benefits of your efforts.

A new and modern course in inventing and patenting, prepared by experts and now offered by the International Correspondence Schools, will give you this essential knowledge! It's practical and economical. This course was prepared in response to a nation-wide demand. It is the answer to many of your problems.

This course will not teach you how to be an inventor. **But if you have the inventive inclination, this course will be invaluable to you. A complete outline of the course will be sent — absolutely free — upon request. Just mark and mail the coupon.**

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"The Universal University" BOX 2317-E SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject *before* which I have marked X: ★

☐ **INVENTION**

☐ Air Conditioning
☐ Radio

☐ Refrigeration
☐ Aviation Engines

☐ Architect	☐ Telegraph Engineer	☐ Plumbing	☐ Air Brakes ☐ Train Operation
☐ Architectural Draftsman	☐ Telephone Work	☐ Steam Fitting	☐ Highway Engineering
☐ Building Estimating	☐ Mechanical Engineer	☐ Heating ☐ Ventilation	☐ Chemistry
☐ Wood Millworking	☐ Mechanical Draftsman	☐ Sheet Metal Worker	☐ Pharmacy
☐ Contractor and Builder	☐ Machinist ☐ Toolmaker	☐ Steam Engineer	☐ Coal Mining Engineer
☐ Structural Draftsman	☐ Patternmaker	☐ Steam Electric Engineer	☐ Navigation ☐ Boilermaker
☐ Structural Engineer	☐ Pipefitter	☐ Civil Engineer	☐ Textile Overseer or Supt.
☐ Electric Wiring	☐ Tinsmith	☐ Surveying and Mapping	☐ Cotton Manufacturing
☐ Electrical Engineer	☐ Bridge Engineer	☐ R. R. Locomotives	☐ Woolen Manufacturing
☐ Electric Lighting	☐ Bridge and Building Foreman	☐ R. R. Section Foreman	☐ Agriculture ☐ Fruit Growing
☐ Welding, Electric and Gas	☐ Gas Engines ☐ Diesel Engines	☐ R. R. Bridge and Building Foreman	☐ Poultry Farming
☐ Reading Shop Blueprints	☐ Automobile Mechanic		☐ Marine Engineer

Name..... Age..... Address.....

City..... State..... Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

SKINNY MEN
Get this news!

Amazing easy way adds solid pounds *Quick!*

Thousands gain 5 to 15 lbs. in a few weeks with new double tonic. Richest imported brewers' ale yeast concentrated 7 times, iron added.

THOUSANDS who were once scrawny, sickly, weak, praise this new easy way to gain weight, strength and health.

As you know, doctors for years have prescribed yeast to build up health. But now with this new yeast discovery in pleasant tablet form, you can get far greater tonic results than with ordinary yeast—regain health, and also put on pounds of solid flesh—*and in a far shorter time.*

Not only are thousands quickly gaining husky, good-looking pounds—but also clear, ruddy skin, freedom from constipation and indigestion, new strength and pep.

2 greatest body-builders in 1

This amazing new product, Ironized Yeast, is made from specially cultured *brewers' ale yeast* imported from Europe—the richest yeast known—which by a new scientific process is concentrated 7 times—*made 7 times more powerful.*

But that is not all! This marvelous, health-building yeast is then *ironized* with 3 special kinds of strengthening iron.

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Results guaranteed

No matter how skinny and weak you may be, this marvelous new Ironized Yeast should build you up in a few short weeks as it has thousands. If you are not delighted with the results of the very first package, your money will be instantly refunded.

Special FREE offer!

To start you building up your health *right away*, we make this absolutely FREE offer. Purchase a package of Ironized Yeast at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body," by a well-known authority. Remember, results are guaranteed with the very first package—*or money refunded.* At all druggists. Ironized Yeast Co., Inc., Dept. 562, Atlanta, Ga.

PRICE 15 CENTS
(20 CENTS IN CANADA)

MODERN MECHANIX AND INVENTIONS

NRA CODE

FEBRUARY
1935

Volume XIII
Number 4

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$500.00 FOR Contest Winners

Perhaps you have made some novelty or toy for your home that will be a winner. A total of $500 in cash prizes is being offered by Modern Mechanix and Inventions for the best home improvement ideas.

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William J. Kostka
Editor

A. Neely Hall
Workshop Expert

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Robert Page Lincoln
Hunting and Fishing Editor

S. S. Rabl
Naval Architect

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ONLY RADIO COVERING 9 TO 2,400 METERS. *12,000 MILE TUNING RANGE*

WORLD'S GREATEST RADIO VALUE

$57.50 *with New Deluxe Auditorium-Type* SPEAKER

30 Days FREE Trial!

TERMS as low as $5.00 DOWN

BEFORE you buy any radio write for the new FREE 1935-36 Midwest "Fifteenth Anniversary" catalog and see for yourself the many reasons why 110,000 satisfied customers bought their radios direct from the Midwest Laboratories and saved from ⅓ to ½. Why pay more than the direct-to-you laboratory price? You, too, can make a positive saving of from 30% to 50% by buying this more economical way. Learn why Midwest outperforms sets costing up to $200.00 and more. Never before so much radio for so little money! Midwest gives you triple protection with: **One-Year Guarantee, Foreign Reception Guarantee, Money-Back Guarantee.**

Only Midwest Gives You Multi-Function Dial

This dial was designed in keeping with the trend of the times, yet is not an airplane dial! It is a many-purpose dial that performs many functions. Now, Midwest guarantees that inexperienced persons can secure good foreign reception. Send for FREE miniature of actual rotating dial which clearly shows these outstanding advantages:

1. **Dial calibrated in Kilocycles, Megacycles and Meters;**
2. **Call letters of American Broadcast Stations printed on dial and illuminated;**
3. **Slow-Fast, Smooth-Acting Tuning;**
4. **Station Group Locator;**
5. **Simplified Tuning Guide Lights;**
6. **Automatic Select-O-Band Indicator;**
7. **Illuminated Pointer Indicator;**
8. **Silent Shadow Tuning—Improvement on Master Tuning;**
9. **Centralized Tuning.**

50 ADVANCED 1935 FEATURES

Many exclusive features include: Micro-Tenuator…Fidel-A-Stat… Separate Audio Generator…Ceramic Coil Forms, etc. Only Midwest covers a tuning range of 9 to 2400 meters (33 Megacycles to 125 KC)—enabling you to easily and successfully tune in even low-powered foreign stations up to 12,000 miles away with crystal-clear, loud-speaker reception.

All 5 Wave Bands enable you to enjoy today's finest High Fidelity American programs. In addition, you get Canadian, police, amateur, commercial, airplane and ship broadcasts and derive new delight and new excitement from unequalled world-wide broadcasts… England, France, Germany, Spain, Italy, Russia, Australia, etc. Send today for money-saving facts!

SENSATIONAL HIGH FIDELITY RECEPTION

The bigger, better, more powerful, clearer-toned, super selective, 16-tube radio gives you absolute realism—assures you of life-like, crystal-clear tone—unlike anything you have ever experienced before. You will hear one more octave—overtones—that cannot be brought in with ordinary radios. Now, hear every instrument, every voice, every shade and inflection of speech.

Take advantage of the amazing 30-day FREE trial offer. Send for FREE catalog.

New Style Consoles

The Midwest 36-page catalog pictures a complete line of beautiful, artistic de luxe consoles and chassis in four colors. Write for new FREE catalog today! **Midwest long-range radios are offered at as low as . . $27.50**

DEAL DIRECT WITH LABORATORIES

Increasing costs are sure to result in higher radio prices soon. Buy before the big advance…NOW…and you can take advantage of Midwest's sensational values…no middleman's profits to pay. You can order your 1935-36 High Fidelity radio from new Midwest catalog with as much certainty of satisfaction as if you were to select it in our great radio laboratories. You save 30% to 50%, when you buy this popular way…you get 30 days FREE trial…**as little as $5.00 down** puts a Midwest radio in your home. Satisfaction guaranteed or money back. Write for new FREE catalog today.

SAVE UP TO 50%

Department Store Executive Says Midwest Is Better Than Sets He Sells

Hon. James A. Farley — I have received many foreign stations including Rome, Italy, Madrid. A friend, head of a radio department in a store said he would rather buy a Midwest than the make he sells. Charles H. Dapraham.

Thrills To Greetings of Foreign Stations

Gabriel Ariano — The natural thrill to listen to my Music or to hear a voice from far off land say, "This is the voice of the Pacific, VK2ME, in Sydney, Australia," etc. We take you now to Premier Address. — Mr. Frederick J. H. Johns, Jr., O. Box 264.

MAIL COUPON TODAY! FOR AMAZING 30-DAY FREE TRIAL OFFER AND NEW 1935 CATALOG

MIDWEST RADIO CORP., Dept. 888 Cincinnati, Ohio.
Without obligation on my part send me your new FREE 1935-36 catalog, FREE Museum Dial, and complete details of your liberal 30-day FREE trial offer. This is NOT an order.

User-Agents Make Easy Extra Money
Check Here ☐ for Details

Name .....

Address .....

Town ..... State .....

☐ Check here if interested in a battery radio.

MIDWEST RADIO CORP.
DEPT. 888 — CINCINNATI, OHIO, U. S. A.
Established 1920 Cable Address Miraco. . . . . All Codes

LEARN AT HOME TO

I'LL TRAIN YOU QUICKLY

FOR GOOD SPARE TIME AND FULL TIME

RADIO JOBS

MANY MAKE $40 $60 $75 A WEEK

Here's Proof

Nets About $50 a Week Besides Sales

"I have been getting along fine. I average ten calls a week, which nets me about $50, not counting profits on sales. I have serviced almost every make of set and have earned more than I ever expected. I owe my success to the N. R. I. and its wonderful Course." — Bernard Costa, 150 Franklin St., Brooklyn, New York.

"$500 a Year in Spare Time"

"Although doing spare time Radio work only, I have averaged about $500 a year extra in addition to my regular income. Full time Radio work would net me many times that amount."—Edw. H. Fawcett, Slough Rd., Ladner, B. C., Canada.

"Good Position, Good Pay"

"I am Chief Operator at Radio Station WBMK. This is a good position with good pay. I have advanced in Radio right along. I recommend N. R. I. to anyone who wants to be successful in Radio."—John Hajduk, Jr., 21 Gerard Ave., Southern Hills, Dayton, Ohio.

If you are dissatisfied with your present job—if you are struggling along in a rut with little or no prospect of anything better than a skinny pay envelope—CLIP AND MAIL THE COUPON NOW! Get my big 64-page FREE BOOK on the opportunities in Radio. Read how quickly you can learn at home in your spare time to be a Radio Expert—what good jobs my graduates have been getting—real jobs with real futures.

Real Opportunities Ahead in Radio for Trained Men

It's hard to find a field with more opportunities awaiting the trained man. Why in 1933 —one of the worst depression years—the Radio industry sold $213,000,000 worth of sets and parts! Radio set sales INCREASED 45%—tube sales INCREASED 25%! Over 200,000 people worked in the industry! It's a gigantic business, even in the worst business years. And look what's ahead! Millions of sets are going out of date annually. 18,000,000 sets are now in operation on which over $200,000,000 are spent EACH YEAR for repairs, servicing, new tubes, etc. Broadcasting stations pay their employees (exclusive of artists) approximately $23,000,000 a year. Advertisers pay 600 great Broadcasting Stations over $75,000,000 a year for Radio time and talent. A few hundred jobs that paid $40, $60, $75 a week 20 years ago have grown to thousands. These figures are so big that they're hard to grasp. Yet they're all TRUE! Here's a new industry that has grown to be a commercial giant! No wonder great business leaders predict a brilliant future for the great and growing Radio industry.

Get into This Field with a Future

There's opportunity for you in Radio. Its future is certain. Television, short wave, police Radio, automobile Radio, loud speaker systems, aviation Radio, marine Radio—in every branch developments and improvements are taking place. Here is a real future for additional thousands of trained men who really know Radio. Get the Training that opens the road to good pay and success! Send me the Coupon NOW—and get full particulars on how easy and interesting I make learning at home. Read the letters from graduates who are today earning real money in this fascinating industry.

Learn at Home in Your Spare Time to Be a Radio Expert

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively in your spare time. You don't have to be a high school or college graduate. My Course is written in a clear, interesting style that most anyone can grasp. I give you practical experience under my 50-50 method of Training—one half from Lesson Books and one half from practical experience with equipment I give you. This unique and unequalled method has been called one of the greatest developments in home study Radio training.

Get the Facts about **THE TESTED WAY**

MAKE MORE MONEY

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

My big 64-page book gives proof that many make $5, $10, $15 a week extra servicing sets in their spare time soon after enrolling. I give you plans and ideas that have made good spare time money—$200 to $1000 a year—for hundreds of fellows. My Course is famous as "the one that pays for itself."

Money Back If Not Satisfied

I am so sure that N. R. I. can train you at home satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lesson and Instruction Service upon completing your Course. You'll get a copy of this agreement with my Book.

64-Page Book of Facts FREE

Get your copy TODAY. It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time job opportunities; it tells you about my Course; what others who have taken it are doing and making. Find out what Radio OFFERS YOU—without the slightest obligation. MAIL THE COUPON in an envelope, or paste it on a penny postcard NOW.

J. E. SMITH, President

National Radio Institute
Dept. 5BH Washington, D. C.

You Get PRACTICAL EXPERIENCE with Radio Equipment I Give You

I'll show you how to use my special Radio Equipment for conducting experiments and building circuits used in such well-known sets as Westinghouse, General Electric, Philco, R. C. A.-Victor, Majestic and others. You work out with your own hands many of the things you read in our lesson books. This 50-50 method of training makes learning at home easy, interesting, fascinating, intensely practical. You learn how sets work, why they work, and how to make them work.

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National Radio Institute, Dept. 5BH
Washington, D. C.

Dear Mr. Smith: Without obligating me, send free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please print plainly.)

NAME ..... AGE.....

ADDRESS .....

CITY ..... STATE.....

TO BETTER PAY Now

Puzzling queries of MM readers are answered by the Problems Editor.

RADIO INTERFERENCE NOISES

My 6-tube superheterodyne D.C. radio is picking up a lot of static, phone dialing clicks and electric switch noises, but I am unable to locate the trouble. Could you help me?—J.W.G., New York, N. Y.

Disconnect the aerial from your set when the interference is heard; if the noises stop, your aerial is the source of trouble.

If an aerial wire or its lead-in is running parallel to electric or telephone wires for any distance, disturbances in those wires will be picked up and amplified by the radio set.

CAN MAGNETISM BE STOPPED?

Is there any material known which, when placed in a magnetic field, will not allow the force of magnetism to pass through it?—H.R.G., Brooklyn, N. Y.

Magnetic fields can be diverted, but not stopped. Some scientists are of the opinion that perpetual motion machines would be possible if a material which would resist a magnetic field could be found.

Iron and its alloys are good conductors of magnetism. Sensitive electrical meters are often shielded against the effects of stray magnetic fields by placing them in heavy iron cases.

LAMP BLACK FACTORY PROBLEMS

I can obtain used auto oil for 5c a gallon. Do you think I could make a profit by converting this oil into soot with the lamp black factory described in the November MM? How is fuel fed into the firebox of this unit?—R.C.W., Lakeland, Florida.

With lamp black retailing at around 40c a pound at hardware and paint stores, you should be able to obtain approximately 25c a pound for your product, and make a good profit.

Clinkers are placed on the bottom of the metal barrel used as a firebox, and oil allowed to drip on these from an overhead feed pipe. A forced draft will increase the speed at which oil is burned, and hasten the production of soot.

MAGNETO IGNITION FOR RACERS

Will you tell me why a high tension magneto system is used instead of a battery for ignition purposes on high speed engines and racing cars? —P.S.R., Fort Thomas, Ky.

Most racing drivers prefer magneto ignition, primarily because it does away with the necessity of carrying a battery which is heavy and bulky. With respect to actual performance, however, there is little difference between the two systems.

WIND-DRIVEN BATTERY CHARGERS

When connecting the field coils of a model T Ford generator in series-parallel to lower the speed at which a propeller-driven unit begins charging a battery, as outlined in the November MM, my generator just runs wild, without putting out any voltage. Where is the trouble?—C. D., Alberta, Canada.

The two pairs of field coils were exactly neutralizing each other as you connected them, with the result that they had no effect upon the armature. It is necessary to reverse the connections to one pair of coils to get the proper polarity for this series-parallel connection.

LOST GOLD LODES

I want to cite an instance of the joys and sorrows of a prospector. For years, off and on, I had been hunting in the hills of Colorado for a lost gold lode. I have at last found this vein—but alas, the unknown discoverer had sunk a 75-foot shaft and taken out all the high grade ore.

I am sure there must be other outcroppings of this vein. Because the vein is in a thicket of scrub cedar, I must have a radio oscillator which can be set up in one position, and readings taken at different points by a small portable pick-up unit. Can you supply me with plans for such a device?—R.M.M., Pueblo, Colorado.

While plans for a radiating treasure finder are not available here, some reader may have such a device or plans for one. Letters addressed to the Problems Editor will be forwarded to R.M.M.

(Editor's Note—All letters sent to this department should include a stamped, addressed envelope. Write to M-M Problems Editor, 529 South 7th St., Minneapolis, Minn.)

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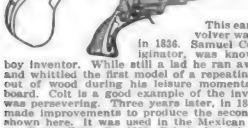
An Early Revolver

This early Colt revolver was patented in 1836. Samuel Colt, its originator, was known as the boy inventor. While still a lad he ran away to sea and whittled the first model of a repeating fire-arm out of wood during his leisure moments on shipboard. Colt is a good example of the inventor who was persevering. Three years later, in 1839, he had made improvements to produce the second revolver shown here. It was used in the Mexican War with excellent effect. By 1852, Colt had the largest fire-arms factory in the world. Colt died a very wealthy man.



This is an early Gillette Safety Razor and the beginning of one of our greatest modern commercial enterprises. Millions of safety razors have since been sold all over the world and millions of dollars of profit have been made. For centuries men shaved with the old straight edge razor. Then came Gillette with his happy idea.

Many Little Ideas Have Big Commercial Possibilities

Look around in any direction today and see the inventor's handiwork. Many of the most successful inventions have been the small things found in tencent stores, drug stores, hardware stores and the like. Many inventions have come from men who did not consider themselves inventors at all. **If you have an idea which in your judgment will make money, save money, save time, save labor or give pleasure—then see about protecting your rights to it.** It costs you nothing to learn the facts. The Patent Laws were made to protect the poor man and the rich man alike. **But you must know how to take advantage of them.**

"RECEIVED your book, 'Patent Protection'," writes an inventor, "and I am only sorry that I did not have the information contained therein some thirty years ago. **I have been unfortunate enough through my ignorance to lose out in at least three major instances where understanding would have helped immeasurably.**"

Another inventor says: "In going through your book, one of your mechanical movements gave me an idea that I am sure I will be able to use in my invention."

We cite these statements from inventors simply to emphasize one point: **Ignorance is dangerous, when Patent matters are concerned.** The easiest way for an inventor to lose his rights, his possible profits, is to do nothing simply because he doesn't know WHAT TO DO.

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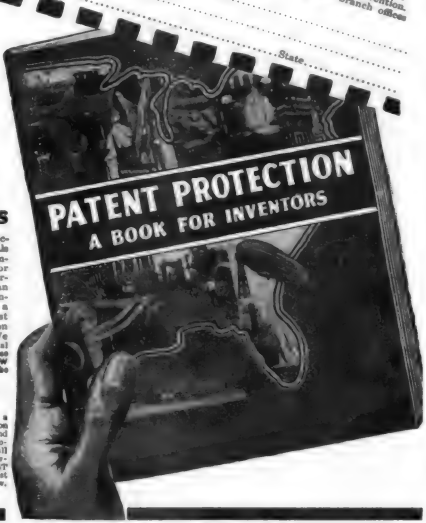

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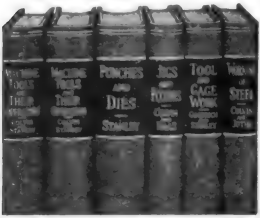

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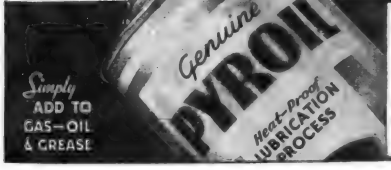

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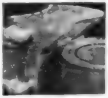

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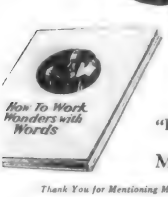

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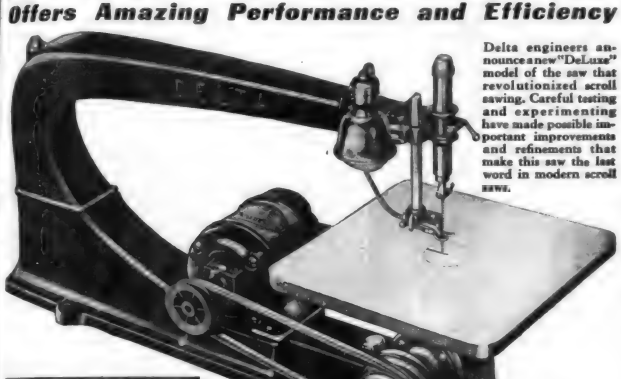

Delta engineers announce a new "DeLuxe" model of the saw that revolutionized scroll sawing. Careful testing and experimenting have made possible important improvements and refinements that make this saw the last word in modern scroll saws.

SPECIAL FEATURES of New DELTA Scroll Saw

1. Enables you to run fine blades at full motor speed without danger of breakage;
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3. Adjustable blade tension;
4. Two convenient guide positions for sawing from front or side of machine;
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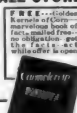

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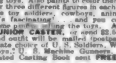

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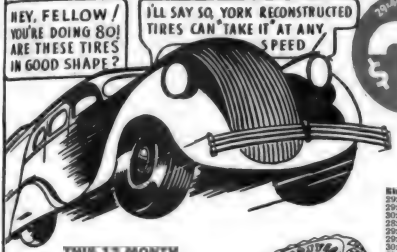

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30x4.50-21		2.40	0.85	28x5.50-18		3.35	1.15
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29x4.75-20		2.60	0.95	30x5.00-18		3.40	1.15
29x5.00-19		2.85	1.05	31x5.00-19		3.40	1.15
30x5.00-20		2.85	1.05	32x5.00-20		3.45	1.15
28x5.25-18		2.90	1.15	33x5.00-21		3.55	1.25
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31x4	2.72	0.85	34x4½	3.45	1.15
32x4	2.86	0.85	30x5	3.45	1.35
33x4	2.94	0.85	32x5	3.75	1.45
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Size	Tires	Tubes
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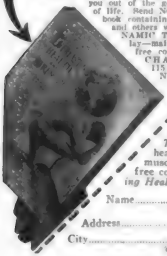

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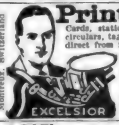

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Diesel—the New Prime Mover

Already Diesels are fast replacing steam and gasoline engines in locomotives, ships, industrial and commercial power plants, motor cars and trucks, aircraft, and tractors, because of their very low operating cost and high efficiency. Soon the Diesel will dominate the power field—throwing scores of employment thousands of men operating other types of units. Why not get into this new line now? For reasons men can grow up with it here important jobs; you older men now handling some other type of power can save your jobs and cost in our experience. Let us show you how to fit in, for increased demand for men trained in Diesel operation and maintenance.

Turning Spare Time into Dollars

Business Training Opens All Doors

General managers, auditors, private secretaries, salesmen, bookkeepers, stenographers, etc., are needed in every company, whether engaged in manufacturing, merchandising, building, transportation, etc. In good times and in bad, accounts and other business records must be kept, correspondence must be handled, the firm's affairs and employees must be directed and supervised. Business pays not for such trained ability, and offers real advancement to those who prepare themselves for bigger responsibilities.

Auto Field Growing Yearly

Think of the army of shop workers, service men, salesmen, chauffeurs, etc., who make possible the convenience and service we get daily from some form of automobile—car or bus, truck or tractor. Auto manufacturers expect to turn out over two million new cars, trucks, etc., in 1935; added to the 25,000,000 already in use, think of the hundreds of thousands employed to supply servicing and repairs, tires, batteries, and other accessories. Of all motion by common use, the auto probably demands the most attention and care—most of which requires trained workers.

Half the men and women employed today are working at jobs that did not exist 30 years ago. Every line of work described here will need trained workers throughout your lifetime.

All are either basic lines, like Architecture, Business, Drafting, Electrical and Automotive Engineering; or new developments like Diesel Engineering and Air Conditioning, that have already built up a popular demand.

Therefore you can safely make any one of these "live" lines your life work.

Building Gets New Impetus

Government figures show that each year adds approximately 900,000 persons to the country's population, and that lately there has been very little provision for housing them. Now that the Federal government is backing several gigantic housing projects, and lending money to home owners, a huge building boom is sure to follow. The increase in building activities will quickly provide almost numberless jobs for men trained in the building trades—architects, contractors, draftsmen, structural steel and concrete workers, carpenters, masons, electricians, plumbers, sheet-metal workers, mill workers, etc. The new impetus given to building will create new jobs in all these lines, both now and for years.

Electricity Is Still Expanding

The important part that power, light, and communication play in our everyday life make electricity one of our biggest industries, offering well-paid employment to millions of trained men and women. And the new uses for electricity constantly being developed insure that it will be a growing industry for a generation to come. Electricity offers a thousand opportunities in manufacturing, transportation, communication, power plant work, etc. If you are looking for real opportunity in a basic line, train for one of the better positions in electricity.

Draftsmen Needed in Every Industry

The draftsman is the first to be hired and the last to be fired, because every structure, machine, and manufactured product starts on the drafting table. His working drawings give detailed instructions to shop and factory workers; carpenters, electricians, and mechanics; workers in steel and stone and concrete, while his contacts and training lead him direct to the big-pay jobs. Every phase of industry is so dependent on the draftsman that he has his pick of well-paid specialized lines, and every improvement or new device creates new jobs and opportunities for him.

Train at Home for the Job You Want

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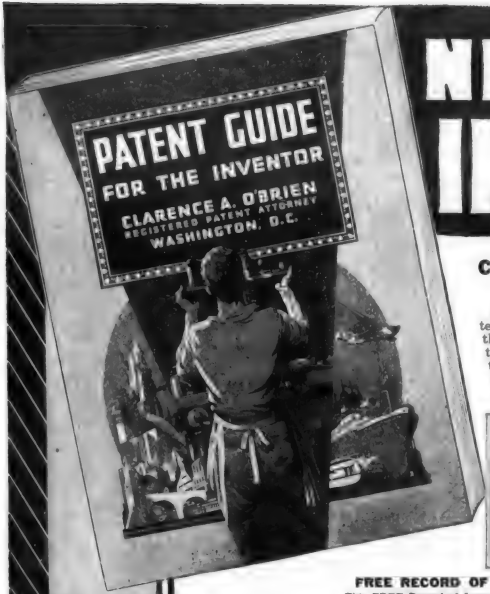

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INVENTIVE FIELDS

Is your invention something for the home, the farm, the factory, the store? Would you like to know whether anything like it has ever been invented? You'll find scores of examples of patents reproduced in my 48-page book. You'll get a good idea of whether you "have something" or not. Would you like to know how you may judge the marketability of your invention? This book gives you several important tests prepared by authorities. Read of the experiences of Bell, Edison, Westinghouse, and other outstanding, successful inventors who patented and thereby protected their inve tions.

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Random Chips from

John Schall was the first reader to send in a photo of MM's arc welder. His picture won first prize of $5.00.

Big surprise is in store for MM readers. Builder of arc welder gets first prize in Workbench contest. First members of DX club give results with MM radios.

DID you ever see the dirigible Macon pop right straight at you out of a fog? We did and thought the moon was falling on the earth. If you have experienced the sensation, you can guess how the next issue of MM is going to hit you. Every page will be a surprise.

We will not let the jack out of the box now, but we'll at least warn you to put in your order early if you want a copy of the March MODERN MECHANIX AND INVENTIONS.

* * *

And next month, too, MM will announce the last of its four contests offering $500.00 in cash prizes, along with the winners of the first big home improvement contest. You still have a chance to enter the second—furniture—contest and win one of the fourteen big prizes. If you have not sent in your entry, you had better do it now. You might win enough to pay off the mortgage. The third big prize contest in this series is announced this month on page 56.

* * *

When the government yanked the light plane fans out of the air, the boys took their props and motors and mounted them on all sorts of contraptions. The results of these experiments were air-drive boats, ice sled, and wagons that have plenty of speed and more thrills than a book full of ghost stories. We are showing you three of these outfits this month which were built by MM readers.

Fred S. Webber, who built the boat, let us in on his plans:

Newport, R. I.

Dear Editor:

I am enclosing a picture of an air-drive boat Clarence Nelson and I built this summer. The float consists of an old aeromarine seaplane pontoon and a couple of MF wing tip floats. The motor is from an old 1915 Metz. Even with this low power she rode high and clean at about 25 m.p.h. We are going to put a model A motor on it and expect to get 30 m.p.h. or better with it.

Fred S. Webber.

* * *

That snappy little ice sled was originally a wind wagon. Its builder, Sam McGlove, says:

Chicago, Ill.

Dear Editor:

I am sending you a picture of an ice sled I built. I am trying it out on the ice for the first time this winter. I got 25 m.p.h. with wagon wheels, but the speed and load were too much for the wheels and they broke down.

Sam McGlove.

* * *

The two passenger cabin ice buggy comes from "out where the snow begins," according to Clifford Gilbertson:

Adams, N. D.

Dear Editor:

Here are the main details of my ice bus: motor, 1919 Chev; length, 14 ft.; width, two ft.; frame, model T chassis and 4 ft. of angle iron for nose; steering, cables and pulley;

This lathe turned table lamp, built by James Howard, won third prize of $2.00 this month.

the Editor's Workbench

motor mount, one inch pipes; axle 4x4, 6 ft. long; height, 40 inches; prop, 3½ ft.; covering plywood and muslin; and cooling system, Ford radiator.

With a home made prop it will do 30 m.p.h. It took about a month to build and worked the first time I tried it.

Clifford Gilbertson.

* * *

The first one in always takes the cake. We knew from letters coming in that many readers were building the arc welder published in the October MM, but John Schall was the first to send us a picture of the completed job. As a result he took first prize of $5.00 this month in the Workbench's monthly photo contests. Here's his brief letter:

West Palm Beach, Fla.

Dear Editor:

I am sending you a snapshot of the arc welder that I built from plans in the October MM. It sure makes lots of spark. I had to send out of town for rods to use for welding.

John Schall.

* * *

A photo of two MM boats, that Albert Loux built, brought him second prize of $3.00.

Atlantic Highlands, N. J.

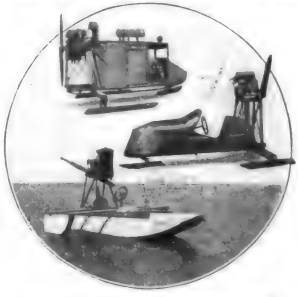
Dear Editor:

I am enclosing a snapshot of "Dorothy" and "Tar Baby" both built by myself from your plans and blue prints. "Dorothy" makes a fine outside boat for fishing here at Sandy Hook, and "Tar Baby," a fine little tender, tows nicely.

"Dorothy" is built very heavy. Keel and timbers are of yellow pine, planking and bottom of cypress, ⅞" on the sides and 1¼" on the bottom. A thousand pounds of ballast makes her ride steady in a sea way and sail very well. My hat is off to Jack Hanna, the designer.

Albert L. Loux.

These two MM boats, the motor cruiser "Dorothy" and the dinghy "Tar Baby," were built by Albert Loux. His picture won second prize. He praises the two designs.



Here are three air-drive outfits. The top two passenger cabin sled was built by Clifford Gilbertson. Fred Webber gets 25 m.p.h. with the aero-boat. Sam McGlove's ice sled (center) made the same speed on land with wheels.

* * *

A wood turning job took third prize of $2.00 this month. It is the table lamp built by James Howard.

Alameda, Calif.

Dear Editor:

I built the table lamp in my home workshop. It is made of highly polished walnut. The base serves as a tray for a three piece smoking set, also made of walnut. The set consists of a wooden barrel cigarette container, a match holder, and an ash tray. The whole works was made on a lathe.

James J. Howard.

"The whole works" looks like a good job to us.

* * *

Down on the short waves radio fans are reaching out and listening in on the world with MM sets.

Edward Burgor, of South Lyon, Mich., writes, saying he gets Venezuela and South America with the adapter in the October issue. With the same outfit used as an all-wave set Peter Tomasky, of Chicago, gets stations in Canada, Cuba, and the U. S. And Homer Lauder, of Pittsburgh, Pa., reached out to GSD, Daventry, England, with the converter in the March, 1934, issue. What success are you having with MM sets? Let's have our own DX club.

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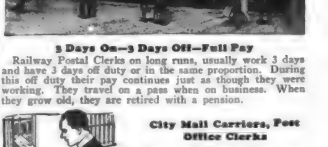
Railway Postal Clerks



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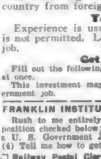

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It's foolish when you can acquire so easily the training you must have . . . when you can make yourself more valuable on your job by devoting a small portion of your spare time to study. In years past millions of men have come to International Correspondence Schools for this training. Today, with its unusual conditions, is bringing many of these men back for *additional* training, to meet and solve the problems of a new day — and many thousands who have decided to face the facts and assure their own futures. This coupon is a challenge to you! Why not mark and mail it — right now? *If desired, you can arrange to complete the course of your choice through easy monthly payments.*

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AROUND THE WORLD ON THE *New Airways of the Seas*

Capt. Eddie Rickenbacker, America's Ace of Aces, is shown above in the cockpit of his World War plane. As commander of the famous 94th (Hat in the Ring) Squadron, he was officially credited with shooting down 26 enemy aircraft during the war, more than any other A.E.F. flier. After the World War he entered the automobile industry and now is vice president of North American Aviation, Inc.

IN MY opinion trans-Atlantic service via Bermuda and the Azores will be in existence within three years with heavier-than-air planes and without stop by dirigibles. Trans-Pacific service is also feasible today with Douglas airplanes.

Within three years there will be a service between Los Angeles and Hawaii; San Francisco and Hawaii; Portland, Oregon, and Hawaii, and from there it will be projected to the Far East, New Zealand and Australia, with service to the Philippine Islands and to Japan and China.

With commercial establishment of these airways the last links will be completed in practical circumnavigation of the world by air. Definite plans for establishment of these airlines are now under way.

Dirigible service is rapidly developing through the efforts of Dr. Hugo Eckener, who is one of the world's pioneer navigators of dirigibles. Due to the fact that he is receiving splendid cooperation from the governments of the various countries involved, it will not be long until we have trans-Atlantic mail and express service followed by passenger service.

With the completion in a few months of the new Pan American Clipper ships, it is the plan of the Pan American Airways to begin its projected air transport service across the Pacific to Canton, China.

Traveling by train and steamship now, it takes about one month to reach Canton from New York City. With this new Clipper ship, equipped as a trans-oceanic training ship, with a range of 3,000 miles and top speed of 191 miles an hour, a service combined with the present transcontinental service from New York to Los Angeles will enable you to reach Canton in less than a week.

SIKORSKY PLANS SEA AIRLINERS

Igor Sikorsky, first designer to have unqualified success with a multi-motored plane, now has in service over Pan-American Airways huge flying boats that can carry a load of 38,000 pounds, 12 passengers, and a crew of five. He declares trans-oceanic service is practical now and looks forward to giant sea planes weighing 100,000 to 125,000 pounds.

"I am confident that we will see ships of that size," he said. "They will have dining rooms, shower baths, smoking lounge, bar, sleeping cabins, and other conveniences.

"We have been thinking and planning for trans-Atlantic service and have reached the point where we believe that the element of danger has been removed for all practical purposes. It will be as safe to travel in these ships as in any trans-continental plane."

Sikorsky predicted that within two or three years seaplanes with a range of 4,500 miles and a cruising speed of 150 to 175 miles an hour would be used in regular service between America and Britain. He has just completed a huge liner for test flights across the Pacific.

By Capt. Eddie Rickenbacker

This noted flier predicts that business men will fly from New York to Canton, China, in a week, a trip that now takes a month. He foresees dirigibles flying around the world for weeks without stopping to land. Read this exclusive, revealing story.

The Douglas luxury airliner (above), which Capt. Eddie Rickenbacker commanded on a record breaking trans-continental flight, is capable of trans-oceanic air service, according to the noted flier. At right Capt. Rickenbacker (in civilian clothes) is shown leaving the plane after flying from Los Angeles, California, to Newark, New Jersey, in 12 hours, 3 minutes, and 50 seconds.

It will not be long until we will see huge dirigibles carrying upwards of 50 to 75 passengers encircling the globe for a period of possibly a month or longer without landing. Airplanes will approach the great airships and become attached to the dirigible, a device having now been developed for such a purpose. Passengers will then be transferred to the airplane, as well as mail and express, and be ferried to their destinations. At the same time the plane will act as a refueling station for the dirigible.

It is my sincere belief that with the present coast to coast services and the inauguration of trans-oceanic service, this year will go down in aeronautical history as the year when the airplane manufacturers assisted by the air transport operators were successful in overcoming the many difficulties they have been encountering for years.

Records accomplished during the last few months prove the phenomenal progress achieved by American air transport lines in the ten years since their inception. If we could look back some thirty-two years when the Wright Brothers climbed into a contraption which they called an airplane and went aloft, even though it was just for one minute and someone had the foresight to visualize the future of aviation and prophesied that by 1934 it would be an overnight flight to California from New York, or an eight hour hop to Miami, I am sure they would have been pronounced insane, but fortunately for us it is an actuality.

Here I would like to mention the flight

Capt. Rickenbacker Tells How Coast to Coast Air Record Was Broken

The MODERN CLIPPER SHIP

After two years of closely guarded construction, this huge flying boat, built in the Glenn L. Martin Co. plant near Baltimore, is the largest air liner in the world. Pan-American airways may use it on a proposed trans-Atlantic line. It can carry 50 passengers, a crew of six, and two tons of mail. Pan-American will name the liner Clipper Number 7.

I recently commanded in one of the Douglas Luxury airliners. It was one of a fleet of fourteen which Eastern Air Lines, Inc., was taking to place on their eight hour service between New York and Miami, as well as their service between Chicago and Miami, and New York and New Orleans.

Having received favorable weather reports, we left Burbank, Calif., after breakfast, at 5:42 a. m. on November 8, with three passengers, a crew of three, and additional gasoline tanks containing 360 gallons.

We climbed to an altitude of approximately 12,000 feet at the rate of 400 feet a minute. Due to encountering crosswinds our speed was slackened and instead of refueling at Chicago, as we were following the Great Northern Circle route, we were forced to land at Kansas City for refueling.

Due to the ability of the TWA personnel at Kansas City to render efficient and quick service, we were only on the ground 12 minutes for refueling with 650 gallons of gasoline and one gallon of oil, as well as changing the crystals in our radio for eastern frequencies.

After leaving Kansas City we climbed to an altitude of approximately 17,000 feet, in other words reaching the sub-stratosphere and with exceptionally good tail winds averaged 256 miles an hour for one hour. We were flying over the clouds from Terre Haute, Ind., until we were over Wilmington, Del. From there on we came down gradually until we landed at Newark Airport at approximately 8:46 p. m., exactly 12 hours, 3 minutes and 50 seconds after leaving Los Angeles, completing the first transcontinental transport trip with only one stop—breakfast in Los Angeles and a late dinner in New York City.

With this new type of Douglas plane, air travel has become a genuine pleasure as at the end of the above trip we all felt fine and ready to turn around and go back. This feature was also proven in the London to Melbourne race as it is reported the pilots in the winning English plane were at the point of exhaustion on their arrival, whereas passengers and crew of the second place Douglas looked fine and quite refreshed.

The above indicates that with the scientific improvement in instruments, radio

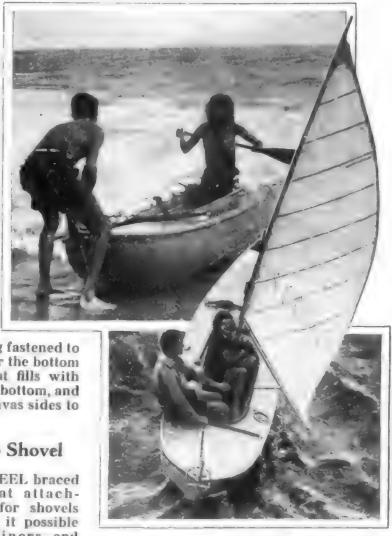
(Continued on page 128)

Young Couple Defies Sea; Sails Pacific in 18-Foot Boat

DODGING the bullets of unfriendly natives, swimming to shore from a capsized boat, and landing amidst a churning surf. These are but a few of the hazards encountered by adventuresome Dana Lamb and his wife as they point the prow of their honeymoon canoe south toward the shores of South America.

The young couple was married in August, 1933, and embarked immediately from Laguna Beach, California, in an 18-foot canoe on a honeymoon which they claim will last about three years.

The canoe has proved seaworthy over the first year of the journey, 2000 miles along the lower California and Mexican shores. It is ingeniously waterproofed with a canvas bag fastened to the combing and extending over the bottom of the cockpit. When the boat fills with water, a zipper is opened in the bottom, and the water is held in the two canvas sides to be dumped overboard.



Above—The adventuresome Lambs embark in their 18-foot canoe after breaking camp. Note the full bodied lines and the broad stern especially built for ocean travel. Below—The Lambs traveling before an easy tail wind.

Handy Seat Attaches to Shovel

The shovel seat clamps at the base of the handle above scoop.

A STEEL braced seat attachment for shovels makes it possible for miners and others working with shovels to sit down to rest or eat without coming in contact with the damp ground.

The seat is composed of a one by ten inch board to which is fastened a bent steel brace which fits snugly around the shovel handle above the large bulge in the scoop.

Photo Plate Records 15 Miles

PHOTOGRAPHS can be made far out of the range of the human eye with the aid of the new super-sensitive, infra-red photographic plate recently perfected. Used during a war in foggy weather, the enemy can be spotted 12 to 15 miles away.

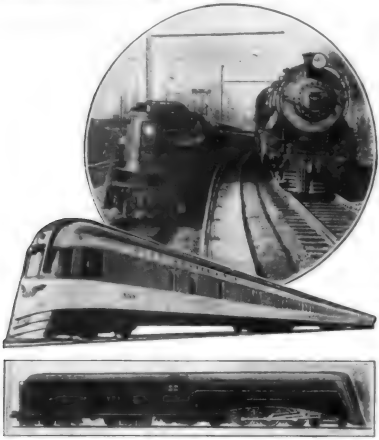
Huge Ship Model Built of Sugar

FOUR weeks' time and 40 pounds of sugar were used by Frank Dumbleton in the construction of a scale model of the S. S. "Queen Mary."

The model measures 5 feet 6 inches long, built on an exact scale of 1 to 200. Wires were used to reinforce the sugar masts.

Frank Dumbleton with his 5½-ft. model of S. S. "Queen Mary." It is entirely constructed of steel wire and sugar.

Streamlined Speed Forges Forward to Replace Iron Horse



Above—A new Pennsylvania electric engine races to beat the "iron horse." Center—New Gulf, Mobile and Northern train. Below—N. Y. Central's streamlined steam engine.

BULLET-TYPE streamlining and the rising demand for speed are rapidly pushing into extinction one of America's first symbols of power—the heavy "iron horse" of the railroads.

The smoke stack, the whistle, pop-off valves, and the bell are going under cover to cut down wind resistance; graceful lines and plated fitting plus light construction and speed combine to construct a horse of a different breed.

The Commodore Vanderbilt, a steam engine now under construction for the New York Central, is entirely enclosed in a metal hood, leaving only the drive wheels open to view. It will be the first streamlined steam locomotive in this country.

The Pennsylvania road has recently purchased 57 streamlined electric engines for passenger service. Likewise, the Gulf Mobile and Northern will soon place in service, between New Orleans and Jackson, a train resembling the Burlington "Zephyr" in design.

Tear Gas Piped to Prison Cells

TEAR gas has been piped into all the cells in Alcatraz, America's stronghold for dangerous criminals. A valve floods every cell with the suffocating gas in case the prisoners riot.

Alcatraz also has a most efficient lock system. Working with a set of levers, an attendant can open all the cells, even or odd numbered or single cells.

Radio Filter Saves Engine Pep

New filters are installed between tip of spark plug and cable clip after removal of suppressors.

A NEW FILTER which fits over the spark plug makes possible the use of an automobile radio without the usual loss of power and acceleration due to use of suppressors.

They have but 100 ohms resistance whereas the ordinary suppressor develops from 10,000 to 15,000 ohms resistance.

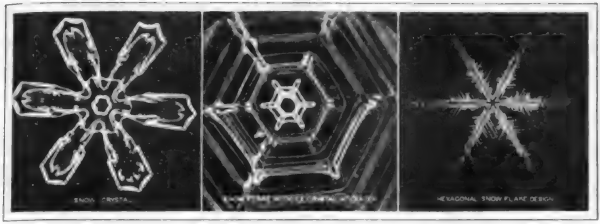
Phone Holder Has Bell in Base

The bell and all the necessary home equipment fit into the compact base of this new bakelite telephone holder.

A NEW telephone holder, designed to eliminate unsightly bell boxes from walls and desks, contains both bell and wiring connections in its base.

It is constructed entirely of bakelite, is 5¾ inches wide and 7¾ inches deep. Due to its compact arrangement, it can accommodate all the standard equipment in this small space.

The holder is designed to work either with or without the dial arrangement.



Your MICROSCOPE Reveals Snow's Beauty

by **Julian D. Corrington, Ph.D.**

TO ONE who follows microscopy as a hobby there is an amazing variety of seasonal activities—plants to study in the spring, pond life in summer, insects in autumn, and feathery crystals in the realm of snow, ice and frost.

Should you have a camera in addition to a microscope, you can easily preserve the intricate geometric gems you will encounter on winter microscopic adventures, taking photographs which will make these marvels of beauty a joy forever.

A board painted black and equipped with two wire handles is used in catching snowflakes as they fall. Examination with a hand lens, holding the breath, will immediately show whether or not the individual crystals will make sufficiently interesting subjects.

Suitable subjects are carried rapidly indoors, into a room where the temperature is the same as that without. A garage, cellar, outbuilding or shed is hence usually most adaptable for this work. From a supply of small, sharp-pointed wooden splints, the operator then chooses one and presses it very gently and carefully upon a selected flake until the crystal adheres to the splint.

Jar the hand or the splint so that the flake next falls gently upon a perfectly clean and cold microscope slide. With a single feather, press the flake softly so that it will thenceforth stick to the slide. After some practice in getting up speed, three or more separate crystals may be so placed on a single slide.

The microscope should be set up to give magnifications anywhere between 10 and 60 diameters, and the eyepiece removed. The photo-micrographic apparatus is arranged in horizontal position so as to point directly toward a window, securing the lighting from the sky or snow outdoors. The camera shutter is set at time exposure and left open, with the iris diaphragm, if present, also wide open.

To preserve delicate crystal formations, study snowflakes and take photo-micrographs in cold room. Do not breath upon slide. At top of page are three unusual snowflake and ice crystal photos, each enlarged 400 times by a microscope.

As soon as one or more snow crystals have been fastened to a microscope slide, the slide is mounted under the spring clips of the microscope, a focus rapidly secured and the plate or film holder quickly inserted in the camera. Now a black card is held in front of the objective of the microscope, the slide of the photographic plate holder removed, and the exposure made.

(Continued on page 133)

HOW the U. S. NAVY

When meeting an enemy fleet of approximately equal strength, American destroyers, cruisers and battleships would take fighting formation pictured above by artist. Each ship concentrates its fire upon the nearest enemy vessel. Control of air will prove a deciding factor in future naval engagements, since fire of big guns is most accurate if directed from observation planes.

By Lieut. John Edwin Hogg
U. S. N. R.

Editor's Note: The views and opinions expressed in this article are those of the author and should not be construed as reflecting the official views or opinions of the United States Navy Department.

IF LORD Nelson, John Paul Jones, Stephen Decatur, or any other great naval hero of history might return to life today not one of them would have the slightest understanding of modern naval warfare, warcraft, strategy, or tactics.

Time was, and within the memory of persons still living, when a navy was a fleet of staunch, wooden sailing ships built to fight when and where they might contact a maritime enemy upon the high seas. These vessels met and banged away at each other with black-powder, muzzle-loading cannon that could actually throw a 6-inch round shot through the side of a wooden battleship at a range of 500 yards. With these crude weapons they fought until one or more ships were disabled. The victors went alongside the vanquished. The ships were lashed together and fighting seamen met on the decks with pistols, cutlasses, kettles of boiling oil, firebrands, unslaked lime, belaying pins, and every other weapon of the day that might be useful in a hand-to-hand free-for-all.

American destroyers laying smoke screen to protect battleship against submarine attack. Our navy has developed pillar type screen shown here, and white blanket spread from airplanes.

Today naval warfare is an entirely different story. It is dreadfully impersonal. Battleships have become floating fortresses of steel and armor plate equipped with weapons that make Lord Nelson's howitzers seem like so many rows of toy popguns.

They are built to fight with 14 and 16-inch guns until they are literally ripped to pieces—and to sink with their guns still in action. They can throw deadly explosive shells by the hundreds of tons upon unseen enemy ships beyond the horizon.

Battleships literally bristle with guns of a multitude of sizes for different purposes of offense and defense. They have torpedo tubes, airplanes, devices for repulsing the attacks of aircraft, submarines, destroyers

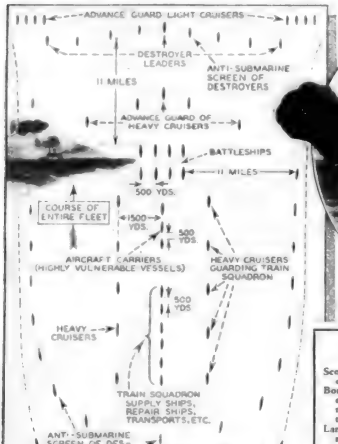
Broadside from great guns of U.S.S. Maryland. These 16-inch guns represent greatest destructive force man has ever been able to create and control. One salvo of well directed shells will completely disable cruiser or other lighter vessel.

and other battleships. A modern battleship is the most complicated and highly integrated piece of mechanism man has ever assembled.

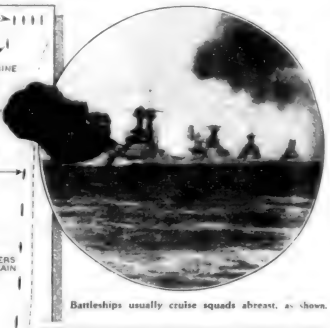
Yet battleships are only a part of a modern navy. A complete battle fleet also requires a complex force of auxiliaries—light cruisers, heavy cruisers, destroyer leaders, destroyers, fleet submarines, aircraft, aircraft carriers, supply ships, hospital ships, transports, etc.

Each type of vessel has its place and plan in modern naval warfare, a subject so complicated that the task of directing a fifty-ring circus would be child's play compared with the responsibilities that rest upon the Commander-in-Chief of the United States Fleet when he takes the navy to sea for a series of maneuvers. When naval officers spend their lives with the navy, becoming masters of a few highly specialized naval subjects, it is not surprising that the average citizen is probably wondering what it is all about.

Of course, it is generally understood that we cannot take the navy to sea in times of peace and shoot up naval ships for the purpose of training men and officers and discovering defects in our equipment; we have to simulate a war. To do this, definite war problems, such as the defense of the Panama Canal, the defense of Hawaii, or the conquering of a maritime force in the Caribbean, are laid out. The navy is then divided into two fleets, one set of ships representing



Cruising formation gives maximum protection to vulnerable airplane carriers, supply ships, transports, when fleet is moving in hostile waters. Some scouting planes are always in air.



Battleships usually cruise squads abreast, as shown.

COMPARATIVE DESTRUCTIVE POWER OF MODERN NAVAL WEAPONS

Scouting plane—Useful for spotting gunfire, but ineffective as an offensive weapon.

Bombing plane—Not particularly dangerous to modern warship, due to high vulnerability, limited carrying capacity and difficulty of bombing moving target from air.

Large naval guns (Battleships)—Most deadly of all military weapons. Little difficulty in hitting ship target with tremendous destruction up to 38,000 yards, limit of range. Modern battleship must literally be torn to pieces before it will sink.

Anti-aircraft guns—Very accurate, and certain destruction to any aircraft hit by explosive shell fragments.

Anti-aircraft machine guns—Little guesswork as to marksmanship up to range of 5 miles. Aircraft cannot be armored against these, for bullets will go through ½-inch armor plate at 7,500 yards.

Aircraft carriers—Invaluable for scouting and intelligence work, but vulnerable to every naval weapon.

Airship (dirigible)—For scouting purposes at sea beyond wecking range of planes, but too vulnerable for offensive maneuvers.

Cruisers—Though vulnerable, tremendous speed and ability to dodge makes them difficult to hit. Excellent commerce raiders.

Destroyers—Powerful offensive weapon, delivering the deadly automobile torpedo. Used for anti-submarine warfare extensively.

Mines—Dangerous naval weapon, but largely nullified by modern mine-sweeping methods and exploding devices used on ships.

Submarines—Primarily a commerce destroyer, but useful for coast defense, picketing of enemy ports, and sea scouting. Highly vulnerable to all naval weapons.

the defending force and the other the attackers or invaders. This sham battle method, of course, has its flaws but it is the nearest approach to the gaining of actual war experience that anyone has yet been able to devise.

During a naval maneuver detailed records are kept on the basis of time. The effective ranges of every naval weapon are all definitely known. So are the gunnery scores of every gun crew in target practice. From such facts certain things are readily ascertained. If, for instance, after a maneuver, it is found that a battleship with a main battery of 16-inch guns got into action with a heavy cruiser at a certain time, and the battleship got in the first salvo, it is safe to assume that the commander of the cruiser might as well have reported himself "sunk." Any part the cruiser may have had in the maneuver after receiving the battleship's salvo would be ruled out. If, on the other hand, the cruiser saw the battleship first through the eyes of one of her flying officers in a scout plane, and the cruiser's 8-inch guns got the first whack at the battleship at any range up to 38,000 yards, we may credit the cruiser with having inflicted some serious damage to the battleship.

The same procedure may be followed with reasonable accuracy in estimating "results" accomplished by any other naval weapon during a maneuver. We know about

(Continued on page 121)

Reverse Acting Propellers Keep Plane on Straight Course

PARAGRAPH ODDITIES OF SCIENCE

A RHINOCEROS "horn" is not horn but hair. The hair is matted together with a gluey substance giving it a horn-like appearance.—W. D. Cochran, Barkerville, B.C.

Arsenic, a deadly poison, is used in some countries to increase the endurance of mountain climbers. Becoming accustomed to it, their daily dose would be fatal to the ordinary person.—Rufus Buchanan, Jr., Minneapolis, Minnesota.

An army rifle bullet will penetrate one half inch of mild steel or five feet of white pine board, but will only pierce about four feet of oiled sawdust.—H. K. Arthur, Delhi, N. Y.

Children experience colder winters and hotter summers than adults. In winter, the temperature is 1½ degrees colder at street level than it is at an altitude of six feet; in summer it is 2½ degrees hotter.—Sigmund Mazel, Chicago, Ill.

The world's longest shadow, cast by a 12,000 foot mountain peak in the Canary Islands, is observed 200 miles at sea.—Leonard Stegeman, Quincy, Ill.

Sunlight turns the common medicine, calomel, into bichloride of mercury, a deadly poison. Therefore, calomel is kept in brown bottles.—Sidney Master, Charleston, West Virginia.

Ants raise mushrooms to feed their young and keep herds of corn-root lice to supply their milk. The mushrooms are planted by carrying spawn to the nest where it is deposited on a leaf. When grown, they are fed to young ants.—Jim Anderson, Jr., Dauphin, Man.—James Annoe, Great Falls, Mont.

Nic Sprunk

Charles L. Brown shows his invention, a set of reverse acting propellers which he claims will eliminate torque.

BY EQUIPPING his monoplane with a double set of propellers, mounted one before the other, Charles L. Brown, Rushville, Mo., gasoline dealer, believes that he has eliminated torque—the tendency of a plane in motion to be pulled off its set course by the pull of its own propeller.

Just as an unaligned automobile wheel pulls the vehicle to one side, the high speed whirling of the propeller in one direction diverts the plane's course.

Brown's propellers act in opposite directions. He believes that they will be generally accepted by aviation experts.

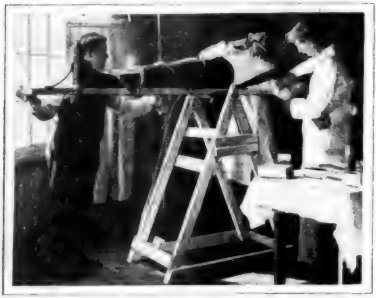
Hitherto, aeroplane builders have been offsetting one of the plane wings to eliminate torque, an operation that presented many knotty technical problems.

Portable Saw Cuts Light Lumber

A NEW, light, portable saw is easily managed with one hand and works lumber up to 1⅞ in. thick. It weighs twelve pounds, is powered by a special universal motor with a cutting speed of 4000 revolutions per minute, and can be raised or lowered at a 45 degree angle for cutting.

The portable circle saw has a pistol grip, cuts 1⅞" lumber.

Scientist to Make Bold Attempt to Revive Human Dead



Dr. Cornish, rear, demonstrates method of reviving dead. The subject is placed on a teetering board to promote circulation as stimulant is injected.

DR. ROBERT E. CORNISH, young California scientist who astounded the nation by bringing the dead dog, Lazarus, back to life, is now preparing to repeat his experiment using human subjects.

He has petitioned the governors of the three states, Colorado, Arizona and Nevada to furnish him with the bodies of criminals after they are pronounced dead in the lethal gas chambers — but his petitions have been rejected on various grounds.

Hearing of his predicament, approximately fifty people, interested both in science and possible remuneration, have offered themselves as subjects. According to Dr. Cornish, most of those offering themselves for "clinical" death are single men.

One man from Kansas, in offering himself as a subject stated he considered $300,000 a fair price for the risk involved.

Tiny Cannon Trains Army Gunners

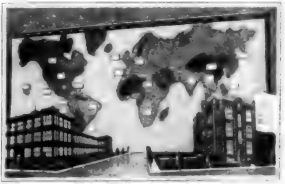
MINIATURE cannons operating with a negligible expense are now replacing the heavier guns throughout the country for army practice work. They are constructed on a proportion of 100 to one with the huge French 75's and allow for the same calculations with a fine-drawn accuracy on short range targets.

Steel jacketed bullets are propelled from the guns by 22 calibre blanks and can be picked up after practice to be used again, thus greatly cutting down practice costs.

The original working model was set up by General Bishop, chief of field artillery. They will be placed in all reserve groups for practical gunnery practice in the near future.

Photo shows miniature of French 75's which shoot steel bullets from 22 calibre blank cartridges with close accuracy.

Students Build Model of School



The above models were constructed from eight-inch plywood, using only razor blades, penknives and a jigsaw as tools.

USING only safety-razor blades, penknives and a jigsaw, two young Scranton model craftsmen constructed a unique and interesting display showing the enrollment of the International Correspondence Schools throughout the world.

The display shows both schools, fully landscaped, before a large relief map of the world. The buildings are made of one-eighth inch plywood, and the trees and shrubbery are fashioned from dyed sponges, using ordinary twigs as miniature tree trunks. Both models are illuminated from within by electric lights.

Storage space for shipping cases is eliminated as the cases serve as the display stand.

U. S. Helps Prospectors Find Alaska Gold

Aerial survey parties ordered out by Federal government have located many profitable lode gold deposits, as well as large quantities of zinc, lead and silver, in Alaska.

GOVERNMENT explorations of mineral and metal deposits in Alaska have disclosed new gold veins and lodes, some containing as much as $80 in gold to the ton. Completion of the automobile road from Mount McKinley National Park to the Kantishna mining district will permit development of the new fields by both the small prospector and the large mine operator.

Nine field parties ordered out by the Federal government made the most complete scientific geologic survey ever undertaken in this far northern U. S. territory. Detailed reports, with maps and charts of the region, have been made available to prospectors, and may be obtained from the United States Geological Survey, Washington, D. C.

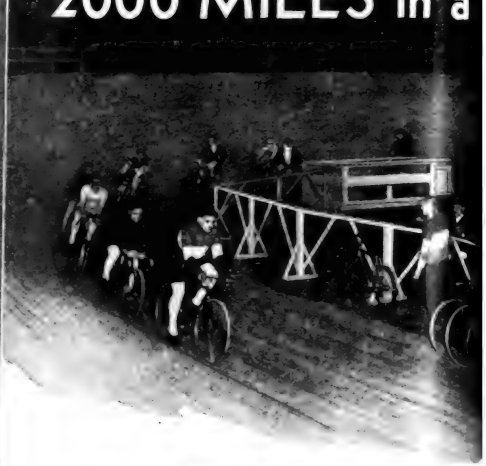
Many gold lode prospects were found in the Girdwood and Moose Pass districts. Although the vein outcrops were small, they contained free gold in almost every case.

Quoting from the official report, "there is reason for believing that the (Willow Creek) district contains many other valuable veins that have not yet been discovered." Many small groups of prospectors are now piling up pay dirt near stream beds, in preparation for placer treatment when water is available in summer.

Government geologists in Alaska are plotting triangulation field in photo at right. Stone markers, erected at high points where visibility is good, aid miners in locating the mineral bodies.

Gold-bearing gravels along the Yukon river in Alaska are being worked profitably by individual miners who set up gin pole and drag line to pile up gravels for placer treatment in the summer.

2000 MILES in a



A group of six-day racers circling the track at Madison Square Gardens, New York. Reggie McNamara, celebrated veteran with more than 125,000 racing miles to his credit, holds the lead. Note referee and relief man in center.

by

JOHN C. HOFFMAN

Behind the dashing thrills of the bike racing game lie many colorful facts unknown to the average fan. Scoring, distance covered, average and top speeds, the conditioning of a rider, and many interesting slants on leading riders are featured in this article.

A BELL rings! The sprints are on! As the sturdy racers increase their pace, the hum of the tires on the hardwood track increases in pitch—only to be entirely drowned out as the spectators roar with excitement.

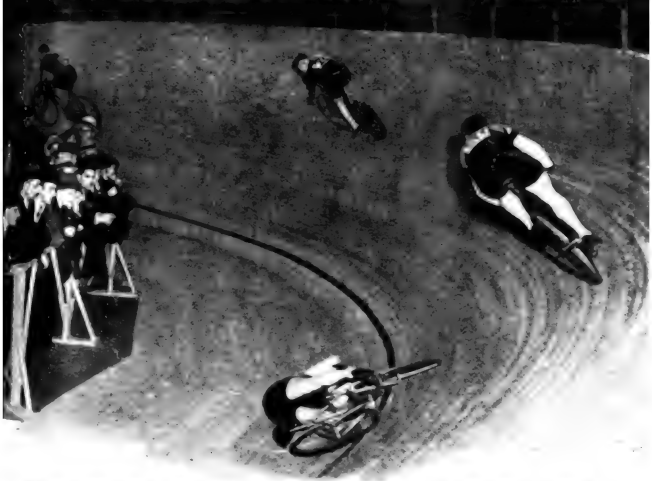
It is the last day of a six-day bike race. The riders hang low over their undershung handlebars, take banked curves horizontally at forty miles per hour, and risk serious spills in the pell-mell scramble for the lead that will bring them coveted points spelling victory.

Here is embodied the color the sportsmen desire—the color and the hazards.

Yet hundreds fail to see the hazards of the game. Let us consider the case of Reggie McNamara, oldest of the active riders. The fact that he is still active, though he has ridden more than 125,000 miles, the equal of five complete trips around the world, is one of the marvels of the sports world. McNamara has broken almost every bone in his body in spills.

In Boston a few years ago, McNamara suffered a broken collar bone, broke his jaw

SIX-DAY BIKE RACE



Four riders take the curves at high speed in the sprints. The camera caught one bike rider in the midst of a fall.

in three places and was carried off the track with his skull cracked open. On another occasion he was thrown against the railing with such force that the impact ripped open more than half his left leg. Hazardry? The game has that.

Unlike most other sports, six-day bicycle riding is singularly free from a maze of foolish rules and regulations. There are a few, to be sure, but once a race is under way it is seldom interrupted by the imposing of penalties, and boresome bickering. This is one of the game's most genuine assets.

What few rules the National Cycling Association insists upon are formulated solely with the desire to maintain sportsmanship and to insure that the race will be won through speed, skill and endurance. The field must be complete at all times except in case of accident. This means that one rider of every team must be on the track every minute of the race.

In relieving his teammate, a rider is required to mount his bike in front of his camp, start ahead of the other riders and be on an absolute equality with his partner before the relieved one can drop out.

Disbarment from the race may be the penalty for stalling, ungentlemanly language, deliberate blocking of traffic, or interference with the riding of other contestants.

In case of accident to one or more riders during the progress of the race by "spills," the bell at the scorers' stand is rung five times to notify the riders that no laps may be gained until the field is again completed. No rider can resume his place in the race after being out of it for over four hours with injuries.

Six-day bicycle racing is not a new sport. Professional racers made their first appearance in the late 80's. It was in 1891 that the first six-day race was run in New York. Albert Shock was the first to introduce the bicycle made with two wheels of the same

(Continued on page 125)

Land-Water Auto Runs on Hollow Wheels

Photos at left shows the land-water auto equipped with its hollow wheels and ready for a plunge into the river. At the right, we see this novel auto traveling up-stream propelled by the six paddles attached to the two rear wheels.

AUTOMOBILES go amphibian and are said to be equally efficient on both land and water when equipped with new hollow wheels, recently invented.

The wheels consist of water-proof drums which support the car on the surface of the water. The front wheels are merely for support, but the rear wheels are equipped with six paddles to propel the craft either forward or backward with 60 per cent of its original land speed. Attachment of these wheels is accomplished with no change in the automobile parts. Extended shaft arrangement keeps them away from fenders.

As these water-wheels are yet in the experimental stage, they are made large for safety's sake, but, in the future, they will be smaller and constructed of lighter material to facilitate handling. It is expected that aluminum will be used in constructing these wheels in the future.

Liquid Dispenser Measures Cream

A NEW self-measuring liquid dispenser, for table use, serves liquids in exactly measured amounts. As the liquid is poured, another portion automatically enters the cylinder above the spout and enters the spout when the container is set upright. Any sized portion can be served.

The dispenser pours exact portions and refills automatically. Beeliveare construction is used to keep the contents cool.

Power Saw Speeds Tree Cutting

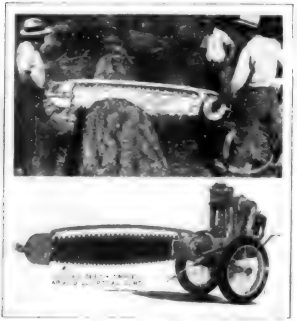
A NEW band saw set on wheels eliminates heavy labor and speeds up the operation of cutting trees.

The teeth of this novel saw are set onto a chain band operating in a continuous circle around a long arm extending from the motor. The arm can be adjusted to any position and is, therefore, used to notch the tree and to saw it from the trunk. In felling a tree, the arm is used in the horizontal position; when bucking, it is used vertically.

The teeth of the saw are detachable and can be removed for sharpening or replacement when necessary. Steel guards protect the operators from dangerous cuts.

The air cooled engine is mounted on a two-wheeled, pneumatic-tired truck. It furnishes 18 horsepower, and is connected to the band saw through a plate clutch.

Two operators, equipped with one of these powered saws are said to be able to cut and buck 100,000 feet of timber in an eight hour day.



Above—The saw travels at high speed to "buck" a large timber. Below—Teeth travel around an oblong center arm.

Beacon Light on Lifebelt Gets Electricity From Water

A LIFEBELT carrying its own beacon light has been developed by Gunnar Winkler, engineering college graduate, for night-time ship disasters. The light itself is built on the principle that any two different metals, when immersed in either fresh or salt water, produce a potential which, when connected to a lamp or other load, causes a flow of electricity.

Lifeboats or other small water craft may also use this new beacon light, for no batteries or generators are needed.

A large number of metal plates, connected in series parallel, dangle in the water.

Miss Barbara May jumps into pool with beacon lifebelt invented by Gunnar Winkler, Worcester Institute of Technology. Light bulb glows when metal plates are under water.

Scooter Chariot Steers by Reins

Horses gallop in rhythm to clicking hoofs, turn at slightest tug by the youthful driver on the reins, on this Ben Hur chariot, newest of scooters. Brakes act on two rubber-tired rear wheels, while small front wheel does steering. Inventor is E. G. Feldin, of Everett, Washington.

REALISTIC horses gallop to the sound of clicking hoofs as the newest of scooters, the three-wheeled Ben Hur chariot, is pushed across the floor. Ivory-colored steeds trimmed with glossy black are made to gallop by pulling on the reins. Steering is also done with the reins, the horses being mounted on the fork of the pivoting front wheel. On this new scooter one foot is used in pushing, as the reins are held one in each hand.

Gasoline Made From Peat

THE successful extraction of gasoline from peat has been announced by scientists of Soviet Russia. In an automobile test run from Leningrad to Moscow the new fuel was said to give more power, with no smoke and smoother running.

Milk Trucks Get Train Rides

TO SPEED delivery of bulk milk to New York City and cut handling costs, milk gathered at dairy farms is being poured directly into trailer tank trucks, and these trailers in turn loaded on railroad cars for shipment to the milk receiving yards.

A special all-steel flat car having two turntables is used in moving the trailers by rail. At the milk receiving yards the turntables are swung into position at right angles to the flat car, and the milk trailers removed by tractors.

Each 2100 gallon milk tank is mounted on a semi-trailer. When a load has been obtained, the trailers are backed onto the flat car turntable and locked into position. Special jacks support the front end of each trailer on the flat car.

After turntable on milk car has been swung into position, 2100-gallon semi-trailer is pulled off by truck, then taken to milk receiving depot of New York Central railroad. Similar method is used in loading trailers on flatcar.

Radiators on 1935 Studebaker models have been narrowed, and louvers carried further forward in graceful curving lines. New Dictator Custom Sedan is pictured at left.

FRONT SPRING BATTLE

KNEE-ACTION, thrust upon a waiting world one year ago with considerable flourish, was hurled back into the arena again as auto manufacturers presented to a waiting public their 1935 models. The sensational discontinuance of independent suspension by Chevrolet, and the adoption in somewhat modified form of this front spring feature by Studebaker are keynotes in the 1935 battle for automotive supremacy.

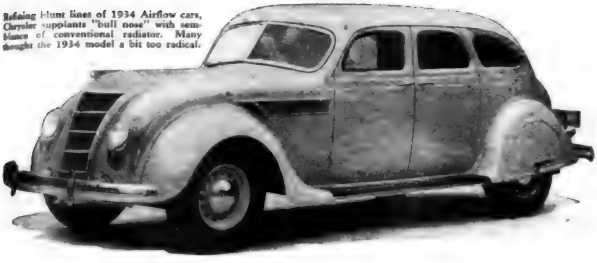
Many reasons are heard as to why Chevrolet decided to revert back to the rigid front axle. Henry Ford, who has stood by the transverse-leaf spring for more than thirty years, successfully sold his 1934 model against the added attraction of knee-action on rival cars. Independent suspension has many good points, automotive engineers claim, but it is understood they have come to the conclusion it has no place on other than the heavier and more expensive cars.

The leaf spring knee-action which Studebaker is introducing for the first time in America resembles the old transverse front spring, but the mounting of the front axle is given an entirely new treatment.

Instead of having the knee-action take place at the wheels, Studebaker places its joints in the axle itself, about five inches on each side of the center. Only about a ten inch length of the front axle is rigidly attached to the chassis. Upper supporting arms take up brake torque and all other reactions encountered in driving, giving a single spring mounting in which there is virtually no change in tread position as each wheel moves freely over obstructions.

There is no solid clamp holding the center of this 18-leaf spring; instead, a unique combination of U-bolt with spring steel plates prevents misalignment or endways slipping, yet permits every inch of the spring to flex freely. It is stated that the

Studebaker utilizes a single transverse spring with long radius knee-action in its new method of front end suspension. Guide links take up brake torque and horizontal road forces. Hydraulic shock absorbers with rubber bumpers add comfort.



Refusing blunt lines of 1934 Airflow cars, Chrysler supplants "bull nose" with semblance of conventional radiator. Many thought the 1934 model a bit too radical.

Rules 1935 Auto Models

by GLENN F. JENKINS

use of this spring mounting eliminates body roll and tire howl when turning corners.

The fiercest battle ever waged in the automotive industry is due this year in the lower price field. Practically all the refinements and mechanical improvements for 1935 are in the low-priced cars. In 1934 the Big Four in motordom—Cadillac, Lincoln, Packard and Pierce-Arrow—accounted for not much more than 12,000 of the nearly 300,000 cars sold.

Next to the front wheel controversy one of the biggest pieces of news comes from the Chrysler group—Dodge, Plymouth, DeSoto and Chrysler. As announced in the last issue of MODERN MECHANIX AND INVENTIONS, the blunt front end of the Airflow cars is being abandoned. Motorists like these cars, as

(Continued on page 121)

Interior of new Studebaker President, finished in black and chromium, with phantom type steering wheel. Radio speaker is mounted just above windshield, flush with interior trim of car, giving "ear-level" reception for passengers.

Characteristic of new trend in automobile body design is the 1935 Hupmobile. Most outstanding of new mechanical features is power braking, giving feather touch brake control. Body interior is much wider and roomier than heretofore.

Irish "Twin-Train" Rolls On Monorail

Here's a railroad line where derailments are unheard of. The twin locomotive with five coaches, straddling this monorail track, makes two trips daily between the Irish towns of Bally Bunion and Killarney. Drive wheels are between boilers.

BETWEEN the towns of Bally Bunion and Killarney, Ireland, runs what is believed to be the oldest monorail transportation system in the world—a sort of "twin-train," in which cars as well as locomotive straddle the single steel rail mounted about three foot above ground.

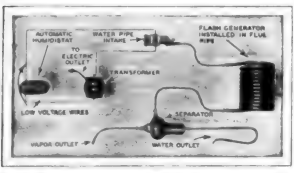
Passengers are divided evenly between the two sections of each straddling car, to balance the load as much as possible. Even the locomotive is split into two parts, with identical boilers and smokestacks on each side.

Five cars are generally pulled, and two trips a day made on this novel railroad line.

Humidifier Delivers Warm Vapor

HUMIDITY is automatically maintained at the most comfortable level by a compact new air conditioning system developed for the average size home.

A sensitive humidity control mounted in one room is connected through a transformer to open or close a solenoid water valve. As the humidity drops, water is sent through a generating coil in the furnace. A separator unit removes water drops from the steam, then mixes the warm vapor with heated air.



Five major parts of new home humidifying system are shown above as they would be connected together in actual use.

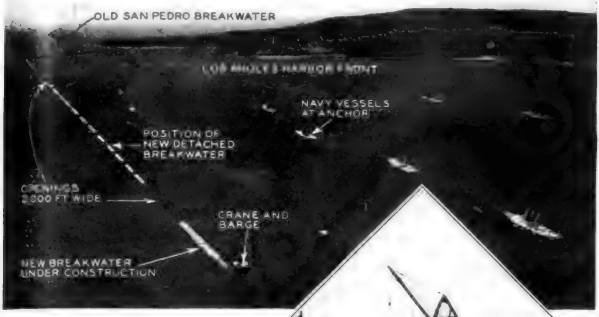
Coin-Size Radio Gets Programs

Adjustments are very delicate on this midget crystal set, believed to be smallest working receiver in world. Entire set (encircled by arrow) is scarcely larger than small coin. Stations are tuned in by moving coil taps with screwdriver, while sensitivity is controlled by tiny crystal detector.

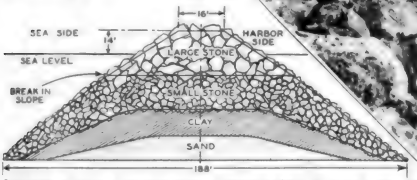
WHAT is believed to be the world's smallest radio set, a crystal receiver whose greatest dimension is less than half an inch, has been constructed by 18-year old Alfred Hinch of London, England. Programs from local broadcasting stations can be heard clearly and with good volume on ordinary headphones.

To hear programs on this tiny set, connections are made merely to a good aerial and to a ground pipe. No batteries are needed. Tuning is obtained with a tiny coil and slide contact, just as in larger crystal receiver units.

Los Angeles Pushes Harbor Out to Sea



Waterfront of Los Angeles, where extension of old San Pedro breakwater is being built three miles out to sea by dumping millions of tons of rock. The breakwater will have two entrances for ships.



Cross-section of new Los Angeles breakwater, showing positions of various layers. While water readily passes between the rocks at crest, waves and ground swells are stopped.

Floating derrick picks 10-ton chunks of rock from scows, drops them on line of $6,000,000 Los Angeles breakwater. Average depth of harbor is 64 feet, while structure will rise 14 feet above waves. Sand dredged from inner harbor is loaded on scows, then dumped over side.

TO PROVIDE anchorage for ships of Uncle Sam's navy as well as many commercial vessels, Los Angeles is pushing its already large harbor three miles out to sea. For four more years giant scows will carry hundreds of thousands of tons of rock from Catalina island in building the $6,000,000 breakwater which will dam off a 10 mile square section of the sea.

Lighthouse beacons at the ends of each breakwater section will guide vessels into the anchorage at night.

Sand dredged from the inner harbor will form the 12-foot high base of this 2.37 mile long breakwater. Over this will be placed a 12-foot thick layer of clay, to prevent escape of the sand. Three million tons of rock, the chunks weighing from 1 to 10 tons each, will eventually be dropped along the line of the breakwater, bringing the height of the structure to an average of 14 feet above the rolling waves.

The new breakwater will contain nearly one-third "voids" or open spaces between the rocks, to permit ebb and flow of the tide. The rocky structure is designed to stop ground swells on their mad rush toward land, to close off ocean currents, and to break up choppy surface water sometimes whipped into dangerous waves by storms which may be raging hundreds of miles out on the Pacific.

Tests made by army engineers indicate that the sand and clay base will not "run," or be squeezed out by the over-topping layer of gehlenite rock.

CASH for NOVELTIES in

If you prepare photos for your entries, like those of china doll door stop and nut bowl above, take them outdoors against light background, or set indoors against white sheet and use artificial illumination. Your sketches need be no more elaborate than those shown above for the two projects described in this article. Make squared paper design for curved outlines.

Isn't there a table lamp, magazine rack, or other small novelty somewhere about the house, which you have designed and built in your own workshop, of which you are especially proud? By telling us in not more than 1000 words just how it was built, and drawing up a few sketches, you have a good chance to win one of 14 prizes in this $125.00 cash contest.

This contest for novelties for the home is the third of a series offering $500.00 in cash prizes. Each contest is separate from the others. In all four contests you have an opportunity to win one or more of 56 different prizes.

Submit as many ideas as you wish, but first be sure you follow out the rules listed on the following page.

Two sample entries for the novelty contest have been worked up here, with sketches and photographs, to show you how easy it is to prepare your own entry. Other possibilities include toys, novelty ash trays, magazine racks, and models.

by OSCAR E. OLSON

IN ALMOST every home there is need for doorstops of attractive design, yet heavy and sturdy enough to withstand rough handling. This china doll, imbedded in concrete, then dressed in bright oilcloth, is quickly and easily made from inexpensive materials, and will find a ready welcome in any room.

An empty coffee can of the one pound size is filled with concrete, and a six inch china doll set in to a depth of one inch. The stiff wire handle, with ends bent into a circle as shown in the above sketches, is also set in the concrete before it hardens.

When the cement has set, the can is wrapped in heavy cloth or felt to pad the sharp edges, then covered with black oilcloth—either sewed or cemented into place.

The wire handle is covered with a 1½"

SEE MARCH M-M FOR

$500.00 Home CONTESTS

Third in a series of four monthly contests offering $500.00 in cash prizes to Modern Mechanix and Inventions readers is this $125.00 contest for original and clever novelty designs.

You may get an idea for your own entry from one of the novelty projects pictured here. Simple articles showing cleverness and originality in design will stand a better chance than large and elaborate novelties. Use inexpensive materials.

wide strip of the same oilcloth, using an applique stitch for fastening.

Any bright-colored piece of oilcloth is made into a flaring skirt for the doll; this extends well out over the base.

The waist of the doll, in another bright color, is held on by two shoulder straps. As a final gay touch, a 3" oilcloth flower is stitched to the top of the handle.

Nut Bowl Is Turned on Lathe

The combination nut cracker and veneer bowl is turned from well seasoned hardwood stock to the dimensions shown in the diagrams. The bowl edge is left thick enough to be re-enforced with ¼" dowel pins spaced 2¼" apart, providing extra strength to withstand the shock of pounding.

The hammer is made 8" long, and turned from the same material as the bowl. Anvil and hammer head are quickly turned out on a machine lathe, or made from ordinary pipe caps.

Holes are bored around the anvil with a 3/16" drill at an angle for the nut picks.

All parts are finished with French polish, made up by mixing two parts linseed oil with one part shellac, and applying while the work is revolving at high speed.

FOURTH $125 CONTEST

RULES FOR THIRD CONTEST

Designs for novelties of any size, for which there is some use about the home, may be entered in this contest.

Each entry must consist of working sketches and a clear description, of less than 1000 words, telling just how the article was made. Photographs, while not required, may in many cases be used in place of some of the sketches. Contestants may submit the completed novelty if they desire; these will be returned after the contest if sufficient return postage is sent with each article.

Readers may submit as many entries as they wish in this contest, whether or not they have entered in the first two contests. Each contest is different and will be judged independently of the others.

Modern Mechanix and Invention reserves the right to publish the design of any winning entry without further compensation to the contestant.

Each contestant agrees to permit Modern Mechanix and Inventions to publish all or part of any entry not winning a prize. Regular rates for the amount of material used will be paid in such cases. No manuscripts or photogra, hs of entries will be returned.

Prizes will be awarded as follows to the fourteen most novel and practical entries: First prize $60.00; second prize $20.00; third prize $8.00; five fourth prizes of $5.00 each; six fifth prizes of $2.00 each; total $125.00.

The decisions of judges, who will be editors of Modern Mechanix and Inventions, are final. In case of ties, duplicate prizes will be awarded.

Address your entries to Home Novelty Contest Editor, Modern Mechanix and Inventions, 529 S. Seventh St., Minneapolis, Minn. All entries must reach this office before midnight, Feb. 22, 1935. Winners will be announced in the May, 1935, issue. The fourth and last in this series of home projects contests, with another $125.00 in prizes, will be announced in the March issue.

16-Tube All-Wave Radio Has Spot-of-Light Station Finder

Modernistic even to octagonal design of tube shields is this 1935 all-wave radio receiver model. Chassis of powerful 16-tube model is pictured above, while photo at left shows one of cabinet designs having inclined speaker grill. Set picks up programs from 9 to 2400 meters with world-wide coverage. New disc dial makes tuning much simpler.

TUNING-IN of foreign, amateur and commercial short-wave programs without use of a log book is a simple matter with the rotating disc and spot-of-light dial used on one of the most powerful of 1935 all-wave radio receivers. On this 16-tube set call letters of broadcast band stations, as well as locations of the different types of short wave programs, are printed directly on the large disc dial.

While on older all-wave sets the dial was generally shifted when bands were changed, here the dial is stationary, and a light-beam indicator shifts to the band being used.

Other features of this 1935 model receiver include an amplified automatic volume control which prevents fading and distortion on foreign stations, hair-line tuning selectivity even on powerful local stations, and a sensitivity control.

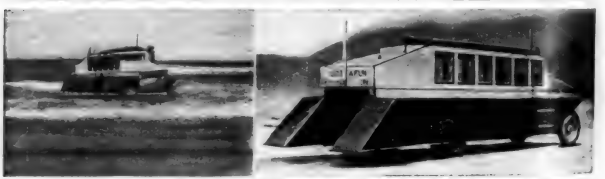
Auto Lifeboat Rolls Through Surf

SEASHORE visitors who want thrills of surf-riding without getting wet charter "Lottafun"—an ocean-going automobile invented and built by M. E. Howe of Oregon.

The novel amphibian, racing across the sands at 15 m.p.h. like an ordinary automobile, plunges through surf and breakers with ease, the passengers fully protected by the glass-enclosed cabin. In the water two paddle wheels geared to the auto engine drive the craft at the same speed as on land. Regulation auto tires take up part of the jar when the boat comes onto land after a dash through the surf.

The value of the amphibian craft as a lifeboat has already been demonstrated in a number of thrilling rescues. Where life guards would be helpless against strong rip tides or high waves, the 12-passenger boat plunges out to the rescue, sometimes completely submerged by breaking waves, yet never in danger.

Gearshifts are operated by the driver to control the speed of both wheels and paddles. On land the paddles prevent stalling in soft sand.



"Lottafun", Oregon amphibian craft, carrying load of thrill-seeking seashore visitors, plunges out through surf after speedy run along beach sands. There's room for 12 passengers in this 32-foot long version of inventor M. E. Howe's design.

DRESSER BED WITH RADIO, PHONE AMONG NEWEST HOME COMFORTS

DUSTLESS VENTILATOR with noiseless electric fan, which draws fresh, filtered, pollen-free air through window without creating draft, permits hay-fever sufferers to stay at home in summer. Special design of the unit also keeps out street noises.

TOASTER-TRAY simplifies serving of light lunches to guests or to those who breakfast in bed. Tray is of crystal-clear glass; electric toaster is modernistic heat saving design fits into one end.

DRESSER BED has two cedar drawers built into foot, shelves for radio, lamp, telephone and books at head. Bed itself is made of solid maple or cherry, and is available in various sizes. Cedar aroma rising from chest protects mattress from moth attacks.

PAPER CUP FOR COFFEE GROUNDS filters coffee, giving amber-clear drink with no sediment in cup. Shaking of coffee pot to get out grounds which ordinarily stick to sides is no longer necessary, for the cup is easily lifted out.

BIG PROJECTS o

Photo shows the Norris dam, located about 20 miles northwest of Knoxville, as it will look when completed in 1936. It will impound a lake with a 900-mile shore line and will cost $35,000,000. It runs 1872 feet across the Clinch river.

BLASTING dynamite, clattering steel, and the roar of mighty machinery combine to shatter the silence of the Tennessee valley as the government pushes work to develop its "49th state," with its 2,000,000 people, into one of the country's leading industrial sections.

This so-called "49th state" stretches 600 miles through seven states, Virginia, North Carolina, Kentucky, Tennessee, Georgia, Alabama and Mississippi, covering approximately 40,000 square miles.

In this area, the government is building and planning seven dams and a city that is akin to the worker's idea of Utopia. The control of these vast projects rests in the hands of the Tennessee Valley authority, and it is estimated that the work now under way will ultimately demand the employment of 20,000 men.

Under the supervision of Dr. A. E. Morgan, chairman of the board of directors, two dams, Norris and Wheeler, are now under construction to aid and control the power of the mighty Wilson dam at Muscle Shoals. Wilson dam is now generating at a capacity of 612,000 horsepower, furnishing enough power to supply the states of New York, Pennsylvania and Illinois with electricity at the same time. Engineers estimate that

The latest photo of Wilson dam at Muscle Shoals. This dam alone is now generating 612,000 horsepower, furnishing enough electricity to supply all of New York, Pennsylvania and Illinois simultaneously.

Uncle Sam's 49th STATE

Millions of dollars are being spent, and over 20,000 people have found employment under the gigantic dam building program of the Tennessee Valley authority. Interesting details of work at Norris and Wheeler dams are given in this article on our "49th state."

with the entire project completed, the valley watershed will operate at a capacity of 3,000,000 horsepower.

Norris dam is located 20 miles northwest of Knoxville, and will bottle up the Clinch river ⅓ mile below the point where it is joined by Cove Creek. Though it has two 66,000 h.p. generators, it is primarily a storage dam, built to back up the flood waters and to release them during low-water periods to generate power at the Wheeler and Wilson dams 230 miles down-stream.

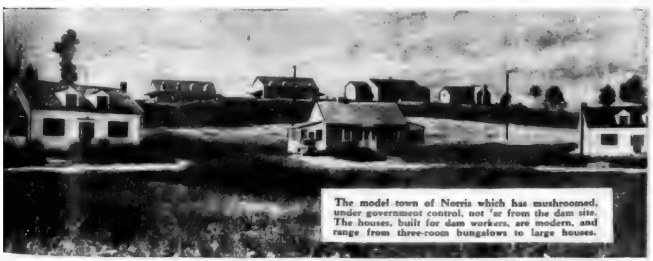
The dam is of the gravity type construction. Rather than being dependent upon braces, it slopes from the top to a 210 foot base and is dependent upon its own weight to remain upright.

Built at a cost of $35,000,000 it will rear 253 feet above the valley and, during the flood period, will impound the waters into one of the world's largest reservoirs with a shore-line of 900 miles.

The concrete section of the dam will be attached directly to the steep west abutment of the valley and will run 1,570 feet across the river where it will be flanked by a 302 foot earth fill extending over the

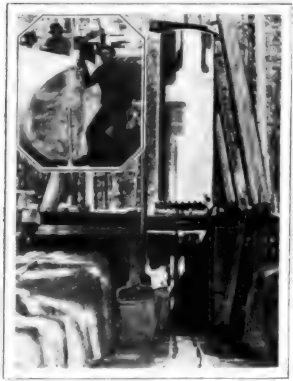
(Continued on page 135)

Above—an artist's drawing of the completed Wheeler dam looking south from the navigation lock. Over a mile long, it will be one of the longest gravity type dams in the country. Below—Shaded area on the map shows the "49th state."



The model town of Norris which has mushroomed, under government control, not far from the dam site. The houses, built for dam workers, are modern, and range from three-room bungalows to large houses.

Operator Rides Into Earth on Hollow Shaft Rock Drill



Dangling in air is three-ton steel shell with hardened teeth at lower edge, used in cutting 4-ft. diameter emergency exit through solid rock for California gold mine. Inset shows J. B. Newsom, inventor, beside one of rock cores.

CAPABLE of cutting cores eight feet long and four feet in diameter out of solid rock, a hollow shaft drilling machine invented by J. B. Newsom of Grass Valley, California, is being used to drill a 500-foot deep ventilation shaft and emergency exit at the Brunswick Mines.

A novel feature of this invention is the fact that the operator is lowered into the rock with the drill, instead of being at the surface. He is protected from falling debris by a steel hood.

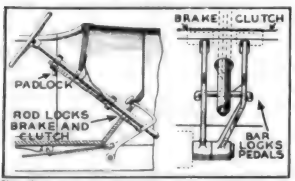
The cutting element, a hollow cylinder weighing three tons, is driven by a forty horsepower electric motor through reduction gears. Hardened shot is fed under the cutting teeth to serve as abrasive.

After cutting, cores are loosened at the bottom by wedges and small charges of powder. Drill, core, electric motor and operator are then hoisted to the surface, the rock core lifted out, and the process repeated.

Auto Brakes Set by New Lock

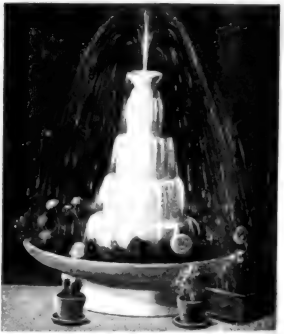
NEWEST of anti-theft devices for automobiles is a device which locks all four wheel brakes, disengages the clutch, and at the same time disconnects the stop light. Cars equipped with this new lock can be left safely with the motor running.

A case-hardened steel fork held to the steering post by clamps pushes both brake and clutch pedals down in one movement. In the upper end of this sliding fork is a series of holes which enables the pedals to be depressed any desired amount, then locked in position with a modern tumbler-type padlock. The fork may be adjusted to a number of different positions, making it ideal for adjusting brakes.



Side view at left shows installation of new theft-proof auto lock. Fork at right depresses both clutch and brake pedals.

Table Fountain Boosts Humidity



Colored light bulb inside porcelain tower gives radiant glow to cascading waters of this electric table fountain.

FROM Germany comes a novel porcelain table fountain and flower stand, with water falling back in cascades only to be forced upwards again by the tiny self-contained electric pump. Under colored illumination the shimmering droplets add a pleasing charm to any room.

The finely atomized spray increases the comfort of heated rooms by raising the humidity, thus giving to the fountain a useful as well as decorative purpose.

Engineers Move Mountain to Build Road

FACED with the problem of cutting down a steep grade and eliminating a series of hairpin turns in a California highway project, engineers are literally moving a mountain out of the way with the aid of a pair of giant hydraulic monitors.

This innovation in road building is now under way on the Weaverville highway which winds through the Coast Range mountains from the Sacramento valley to the famous Redwood Highway on the coast. A cut 400 feet deep, involving the removal of 6,000,000 cubic yards of dirt and rock, is being made through the mountain.

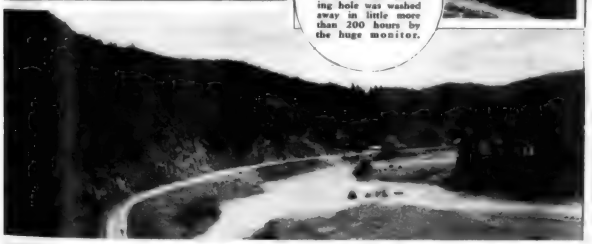
Huge hydraulic monitors wash away the soil which deposits itself in Oregon Gulch on the west side of the mountain. This soil will form a gentle slope to the new summit of Oregon hill when the work is completed.

Two of the hydraulic giants have been set up. One has an 8-inch nozzle; the other, 7. The former discharges 2400 miner's inches, or 60 cubic feet of water per second. Approximately two tons of water leave the nozzle every second with a velocity of about 200 feet per second, striking the bank with a terrific impact and carrying away huge amounts of dirt and rock. The tremendous power of the hydraulic stream easily removes material which ordinarily would have to be blasted away.

It is estimated that four years will be required to complete the project which will shorten the highway by about 2½ miles.

This hydraulic giant is hurling 2 tons of water per second at a velocity of 2 miles per minute against the mountain. About 5200 cubic yards are moved every day.

Photo shows how the hydraulic stream cuts its way through dirt and rock. This yawning hole was washed away in little more than 200 hours by the huge monitor.

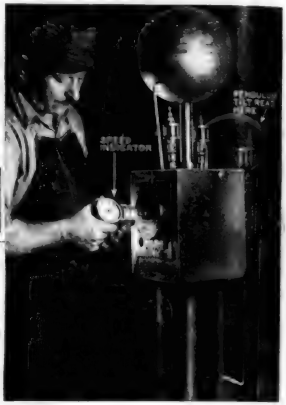


Here is a completed section of the highway, linking the Sacramento valley with the Redwood Highway on the coast. To eliminate steep grades and dozens of hairpin turns, a cut 400 feet deep is being laid through the mountain.

WHAT OIL IS

Read the answer here—learn how to buy proper oils and cylinder-head lubricants for your car.

A single application of Pyroil, special carbon lubricant, increased speed of this model four-cylinder gasoline engine from 6200 to 8000 r.p.m. Engine was designed and built by Elmer Wall, of Chicago. It develops 1 h.p., enough to drive 6-ft. long model boats and midget automobiles.



This pendulum type friction machine at the Armour Institute of Technology, Chicago, tests value of motor oil under actual operating conditions. Tilt of 600-pound pendulum as shaft revolves at high speed shows amount of friction obtained with that oil. Note thermometer just above the speed indicator, which records oil temperature during test.

DOZENS of perplexing questions confront the motorist who attempts to pierce the cloak of mystery surrounding auto lubricating oils. He wants to know which of the many brands and grades of oil will be most economical in his own car—how often he has to completely change his oil—which top-cylinder lubricant will give him the most protection.

It is the first 5,000 miles of driving which determine the useful life of an auto engine. Proper attention to the breaking in of your new car will insure a smooth-running engine, with each bearing a smooth, glistening mirror surface.

Change Oil Often in New Car

Oil in a new car should be changed every 200 miles for the first few times, to wash out fine grindings left after the machining of the bearings. Though even finer than dust, these metallic particles have an abrasive quality which gradually wears down the bearing material.

A machined bearing surface contains thousands of microscopic depressions. These must all be leveled out before the bearing can be in perfect condition. With ordinary oils, it is necessary to wear down the high spots to the level of the depression—a slow process requiring thousands of miles of careful driving.

A special "liquid carbon" lubricant now on the market is being used extensively in safeguarding as well as in hastening the breaking-in process. This material, known as *Pyroil*, is a form of colloidal carbon produced under *Pyroil* special processes and "purified" in an electric-arc furnace under temperatures reaching as high as 7500° F. Under heat so terrific as this, the *Pyroil* carbon is broken up into millions of microscopically small particles—particles so fine that in their carrying agent, they will easily penetrate chamois skin or any filter or duct, or run up a wick. Thus, they find their way to their proper objective.

This colloidal carbon is a lubricant in its own right. Coming in a special oil solution, it is used at the rate of 2 ounces per quart of crankcase oil and 1 ounce per 5 gallons of gasoline. It thus reaches the cylinder walls from above as well as below. The tiny carbon particles are deposited on the metallic surfaces and soon fill up the microscopic depressions, giving a perfectly smooth cylinder wall.

BEST FOR MY CAR?

by J. EWING MORTON

Above demonstration set-up of Pyroil was on display at A Century of Progress last year. Pendulum attached to bearing at left, using ordinary lubricant, shows greater deflection than that of the Pyroil-treated bearing at right. Pyroil reduces friction by making metal surfaces smoother.

Viscosimeter, another of watch-dogs for motorist in constant use at Armour Institute of Technology, checks flow of oil through narrow opening at different temperatures, tells what oils are best for winter.

Once *Pyroil* is rubbed into the bearing surfaces by the action of the motor, it actually penetrates the metal, filling in pores, cracks and crevices. Being non-combustible, it is unaffected by the heat of the combustion chamber. It cannot be washed off by gasoline seeping through the bearings.

In a properly lubricated bearing, a thin film of oil separates the two bearing surfaces at all times. Under extreme pressure or excessive heat this film of oil will sometimes break down or disappear, permitting metal to metal contact which soon melts the babbitt of the bearing.

If too light an oil is used when breaking in a new engine, and *Pyroil* has previously been used in that motor, breakdown of the oil film will produce no damage. The slippery carbon particles take up the functions of the oil film, preventing metal to metal contact.

An auto engine should use at least one quart of oil per 1,000 miles in order that lubrication be effective. On older cars more oil is required, for with worn cylinder walls oil escapes past the piston rings into the combustion chamber.

New car owners should follow the oiling instructions set forth by the manufacturer of their car. Research engineers have made exhaustive tests with that type of engine under varying road conditions and have determined just how often the oil should be changed. Usually a change every 1,000 or 1,500 miles is recommended.

Invisible Dust Speeds Bearing Wear

Dust is one of the greatest enemies of the motorist. If considerable driving in dusty weather is done, frequent oil changes will be necessary. Tests conducted at the University of Minnesota with the almost invisible dust found in middle-western states showed a decided increase in bearing wear when small quantities of the dust were blown into the carburetor air intake.

Where piston rings are slightly worn, oil must be changed more often in winter because of dilution with gasoline. Gasoline

(Continued on page 133)

Dance Fees Set According to the Chemical Value of Coeds

Coeds weighing in before the dance. As they step onto the scales, their chemical value is recorded on the calculator.

THE true chemical value of the coed ranges between fifty cents and a dollar. This strange fact was revealed recently when students of the Massachusetts Institute of Technology were required to pay the chemical value of their co-partners as an entrance fee to an annual dance.

This strange method of payment is not at all unusual for Massachusetts Institute students. In the past, on this occasion, girls have been paid for according to both weight and intelligence.

The girls, upon entering, are asked to step upon the scale. This scale determines their weight, and it is shown upon a breakdown calculator in terms of chemical elements.

The variation of chemicals per pound in different bodies is not great enough to cause an error in this large scale method of determination. The reason for the low value is that the body is composed almost entirely of water.

Altitude Affects Fountain Pens

WHEN traveling at an altitude of over 5,000 feet, do not use a fountain pen, for the removal of the cap will cause all the ink to spurt from the point. This phenomenon is caused by the fact that, whereas earth pressure is maintained around the ink sac, the point is exposed to a reduced pressure, causing compression of the bulb.

Bolt Wrench Needs No Adjustment

The toothed chuck on the wrench head firmly grasps any size stud bolt. It operates from straight or braced handle.

A NEW stud-bolt wrench is especially designed to remove several sizes of bolts without adjustment. The head contains a toothed chuck to grip the bolt and is operated with either a straight handle or a speed brace. In the larger sizes, a ratchet handle is provided.

Hooded Plane Features Economy

A hooded safety cabin plane which operates on one-tenth of the ordinary fuel consumption and lands in a 30-ft. space.

THE latest in air travel is a small "hooded" monoplane which lands or takes off in a thirty-foot area and is said to run with one-tenth the fuel consumption of the ordinary plane.

Resembling a small flying hangar, the plane is constructed under an oval shaped hood designed to aid it in rising and landing in confined areas.

A factory is now under construction to produce these planes on a mass production scale at a price which will compare with that of the lower priced automobiles.

Carbon Arc Heat Rivals the Sun

THE intense brilliancy of the sun will be matched and surpassed with a man-made arc light, according to predictions made by the American Chemical Society.

The prediction was made on the basis of the first accurate measurement of carbon heat, 3,564 degrees Fahrenheit—the hottest burning flame on earth.

Coiffeurs Foil Breezes With a Cellophane Hair Lacquer

A NEW coiffure, "Cellophane Hair," recently developed in Hollywood, is wind proof, according to Lawrence G. Springer, inventor of the process.

A Cellophane lacquer is sprayer onto the hair. While the hair is still wet, it is pressed into shape by the skilled hands of the coiffeur and painted with a small brush. The paint comes in any color milady desires, tints often being chosen to match corsages or gowns.

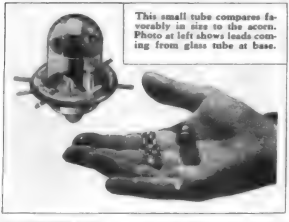
The hair is dried quickly under electric driers, developing, during the drying process, sleek glossy highlights that show to an advantage under artificial lighting.

The coiffure is not easily mussed, and it will stay in place for days.

It is expected that this coiffure will be quite popular for evening wear. The lacquer is easily removed with soap and water.

Photo shows Miss GiGi Parrish having her hair cellophaned by Mr. Springer. Lacquer is contained in the spray gun.

Acorn Tube Aids Experimenters



This small tube compares favorably in size to the acorn. Photo at left shows leads coming from glass tube at base.

RESEMBLING an acorn both in size and shape, a new type radio tube has been designed for amateur and experimental work. It is intended especially for experimentation with micro-waves.

Amateurs are said to be obtaining surprisingly good results with the tube on wave lengths between 90 cm. and 2½ meters.

New Tire Devised for Wheelbarrow

A PNEUMATIC tire for wheelbarrows has recently been released by tire manufacturers. Similar to the bicycle tire —without inner tubing—it is designed for use where steel rims have formerly cut through the running surface. They are ideal for roof work.

This new low pressure tire is ideal for work on soft surfaces.

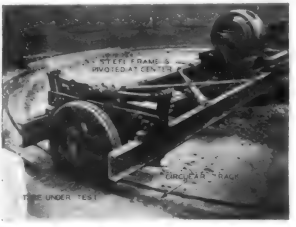
Small Tire Tester Fits in Room

WITH the use of a new circular track, the stability of tires is being tested in England over any road surface within the confines of a single room.

The wheel is attached to a heavy steel framework that pivots from the center at any desired speed. Wheel suspension and shock absorbers are faithfully reproduced from stock automobile models, and any amount of weight can be secured to the frame over the wheel.

For the various tests, the entire track can be surfaced with anything from macadam to mud. Controlled temperature and humidity in the test room make possible detailed study of any road condition.

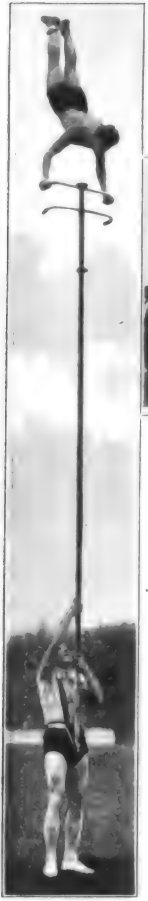
After the machine is started, it needs no attention save for oiling and tire changing.



Circular track can be arranged to simulate any type of road surface. Motor drives wheel at any desired speed.

Learning CIRCUS

Trapeze, tight wire, and balancing acts, that rival professional performances under "the big top," are learned quickly by college students. Here, the circus coach at the University of Illinois reveals how he trains "daring young men for the flying trapeze."



Above—Bob Churchill crawling through a hoop on a tight wire. Exceptional students learn tight wire fundamentals in a week. Left—Len A. Wayman, top mounter, and Victor Mizenko, understander, demonstrate a difficult feat with a high perch pole. Right—In one week John Bowman learned to walk up the rungs while balancing on a ladder.

by **A. MORTON SMITH**

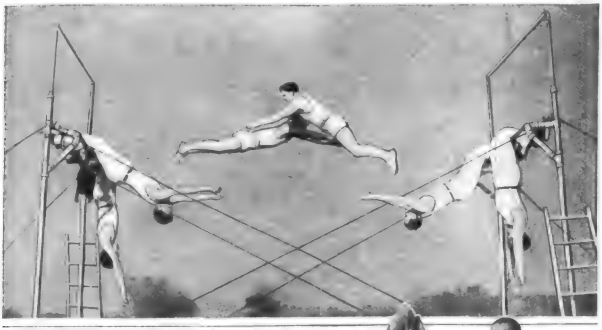
IF YOU want to be an expert circus stunt man, go to college. No longer need the boy, aspiring to be a headliner under "the big top," carry water for the elephants until the boss gives him a chance to show his ability.

As a part of their physical education courses, several colleges now offer to teach students how to perform the thrilling stunts of the slack and tight wire artists, the aerial acrobats, and the balancing stars seen in the circus and on the vaudeville stage.

Many of these schools have taken their cues from the Interscholastic Circus of the University of Illinois, which pioneered in the field. It has demonstrated conclusively that circus artists are "made and not born" and that amateurs are capable of presenting a performance which rivals in excellence those of many professional shows.

C. O. Jackson, who has been director of the circus at the University for the past six years, claims that a creditable amateur circus may be produced by students of any high school or college. It is not necessary

STUNTS *at* COLLEGE



This aerial act is one of the outstanding features of the student circus at the University of Illinois. Students are performing like veterans in this casting act.

to have a professional coach, for Jackson has had no experience in the circus field. His first experiment was as a teacher in the high school at Menominee, Michigan, where he organized and directed a student circus for three years before joining the faculty of the University.

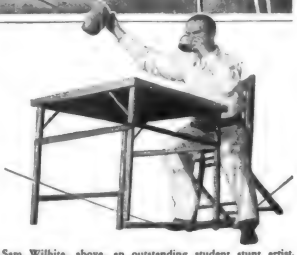
A circus director in a school need not devote a great amount of time to the work. Jackson spends but two hours each afternoon, four days of the week, to his circus classes.

Students Master Many Stunts

Usually the coach has a class of 100 or more young men from which to select his performers. Prospects are made available by the creation of a circus stunts course and students try out for the circus in much the same manner as they do for football, baseball or track. A desire to join the circus is created among the students by exhibiting circus stunts between periods of football and basketball games and at chapel exercises.

Most of the boys have a very definite idea of what they want to do, the director has found, and they usually devote their time to mastering one specific kind of circus feat. On the other hand, there are those who are exceptionally versatile.

Jim Stein, a junior, was just one of many freshmen who enrolled in the circus stunts class two years ago. When he had learned to walk a balancing ladder up and down stairs, he took up cannon ball juggling. When he could handle the spheres satisfactorily, he turned to rope spinning, and when the circus was presented last May in the armory, he also rode a unicycle, or one wheel velocipede, up and down an incline, climbed a ladder while balanced on a slack wire, and balanced on a rolling globe.



Sam Wilhite, above, an outstanding student stunt artist, balances a table and chair and drinks on the slack wire. He became an expert by the end of his sophomore year.

Another star is L. A. Wayman who mastered the intricacies of the slack wire, does hand balancing on chairs and ladders, and is top mounter in a perch pole act.

Rehearsals are conducted four afternoons each week with the class period limited to thirty minutes. Those who are particularly

(Continued on page 118)

Deadly Bushmaster, Caught After 20 Years' Search, Dies

Dr. Raymond L. Ditmars, curator of reptiles at the New York Zoological Gardens, is shown with his rarest reptile, a six foot bushmaster, the first caught alive in 20 years.

THE climax of a twenty years' search was reached last summer when Dr. Raymond L. Ditmars, curator of reptiles at the New York Zoological gardens, brought a deadly bushmaster back from the wilds of Trinidad. But the reptile, unable to adjust himself to man-made surroundings, died several months later.

The capture of the bushmaster was effected by L. A. Thomas, an engineer working in southern Trinidad.

The snake was found in an engine shed near one of the oil derricks in the southern fields. Terrified workers rushed for clubs with which to destroy the deadly menace, but Thomas, recognizing its rarity, stopped them.

At great danger to himself, he wedged a short forked stick over the serpent's head. A terrific battle ensued, but the reptile was subdued when Thomas finally slipped a loop of heavy cord around its writhing body.

The only bushmaster now in captivity is the recent acquisition of Washington Zoo.

Motor Delivery Cycle Perfected

A NEW type of vehicle for delivery purposes has been perfected. It features a motor driven tricycle with the pair of wheels to the front, supporting a roomy basket for packages.

The vehicle is powered by a two-cycle gasoline motor with a gravity gas tank behind the saddle. A chain drive from the sprocket to the rear makes it possible to pedal the machine should the motor fail. The two front wheels are controlled without moving the basket.

Photo shows new type motor delivery vehicle first shown at the Grocer's exhibition in London. Note the basket in the front and the gasoline motor in the rear of the cycle.

Odd Ferry Runs on Sunken Track

The above is not a dwelling house placed on stilts, but a queer ferry that operates on submerged tracks across the gulf lying between St. Malo and St. Serven, Brittany.

PERHAPS the strangest ferry in the world is the one operating across the gulf between St. Malo and St. Serven, Brittany.

The ferry is built on a high superstructure to allow for the rising waters during full tide in the English Channel. The superstructure rests on a set of wheels running on a submerged track set low enough in the gulf so that it in no way interferes with ocean going traffic. Large winches on shore, attached to under-water cables, supply the motive power.

The platform contains chairs and a warming house for cold weather.

Snail Is More Powerful Than Elephant
Nic Sprank in ODDITIES *of* SCIENCE

A SHEET OF PAPER WILL NOT BLOW OFF A PLANE WING! — *The vacuum which exists on the upper wing surface of an airplane in flight holds the paper in position.* — *W. Smith, Hamilton, Ontario.*

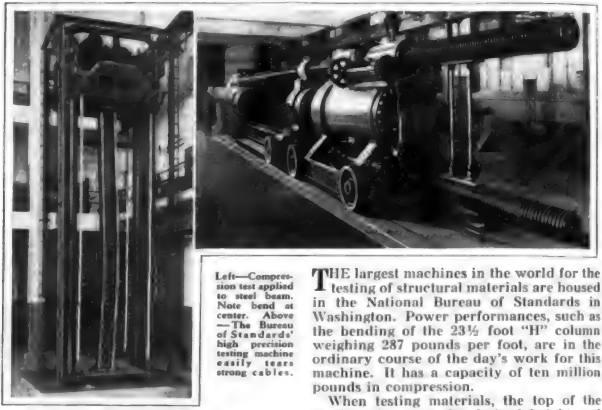
DIRT TRACK RACERS STEER TO RIGHT FOR LEFT TURNS! — *On entering a left turn, the car is thrown into a skid. To prevent spinning, front wheels must then be turned to the right.* — *S. K. Houston, Martinsville, Ind.*

A SUNDAY NEWSPAPER CLEARS 6 ACRES OF TIMBERLAND! — *Several U.S. Sunday papers use 100 tons of paper an issue. To obtain this, 6 acres of well-grown spruce timber must be cut.* — *F. Vincenti, Jr., Mineola, N.Y.*

A SNAIL IS STRONGER THAN AN ELEPHANT! — *The elephant seldom pulls more than his own weight, while the snail will often move objects more than 50 times heavier.* — *K. Thomson, Sidney, Australia.*

Win $1! Send your Oddity of Science to Nic Sprank, Modern Mechanix and Inventions, 529 South 7th Street, Minneapolis. No Oddity will be considered unless source or proof of item is included. Do not include Oddities with letters.

Huge Machines TEST *Building Materials*



Left—Compression test applied to steel beam. Note bend at center. Above—The Bureau of Standards' high precision testing machine easily tears strong cables.

Ski Plane Has Speed and Comfort

A NEW snow plane combining the comfort of an inclosed body with the speed of a Model A engine was recently placed on the market.

The plane is built to accommodate four persons comfortably. It affords them all clear vision through an enlarged windshield and windows placed to the rear of the stream-lined body.

The body is constructed of molybdenum tubing covered with plywood, Flightex and doping. Positive hand and foot brakes operate under compound leverage making a speed of fifty miles per hour safe.

Doctors and policemen working in the rough north are said to be using these planes to advantage.

This streamlined snow plane is fully enclosed, travels at a top speed of 50 miles per hour, and has reliable brakes.

THE largest machines in the world for the testing of structural materials are housed in the National Bureau of Standards in Washington. Power performances, such as the bending of the 23½ foot "H" column weighing 287 pounds per foot, are in the ordinary course of the day's work for this machine. It has a capacity of ten million pounds in compression.

When testing materials, the top of the machine is set to the desired height and secured there. Contrary to the procedure with smaller machines, the pressure is applied from below.

The Bureau's Emery high precision testing machine has a capacity of 2,300,000 pounds in compression and 1,150,000 pounds in tension. One end of the machine is securely fastened, the other end moves on a threaded shaft. Cables are fastened through chuck holes, and the pressure is applied. This machine will tear a four-inch cable as easily as a man breaks cord.

Governor Simplified by Set Key

A GOVERNOR with a key arrangement that makes adjustment a simple task now eliminates mechanical fuss in controlling the speed of automobiles.

Turning the key one direction increases the speed, and reversing the turn decreases speed. Key removal automatically locks governor.

Turn of key increases or decreases set speed of automobile.

Propels Odd Rescue Suit Through Sea With Set of Fins

A RUBBER suit, a life preserver and a set of metal fins have been combined by Albert Hanger, German inventor, for the purpose of walking, immersed to the waist, through water.

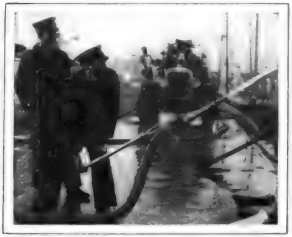
The fins, made of light metal, are attached to the top of the feet and the front of the legs. The foot fins are hinged over the instep so that downward pressure forces them open, adding to resistance. The leg fins open as the leg moves backwards, propelling the "water stroller" forward. When the leg moves forward, the fins fold close below the knee, offering no more resistance than that which the water offers to the ordinary swimmer.

The direction of this odd craft is determined by a set of light paddles which can also be used to hasten the forward speed.

The life preserver is vulcanized to the suit and can be deflated so that the entire outfit may be folded into a compact bundle when not in use. The suit, though designed for rescue work, is expected to be used by hunters and trappers who must work both in open water and heavy swampland.

Albert Hanger, above, clad in the unit which he asserts will eliminate dependence on life boats in sea disasters.

Lever Guides Fire Hose Stream



Three foot rubber handle fastened behind hose nozzle simplifies task of firemen in controlling heavy pressure.

DUE to the application of leverage and balance principles to a fire hose, one man can now handle a high pressure stream of water which formerly required the efforts of several.

The lever consists of a hard rubber handle about three feet long that fastens into the hose coupling behind the nozzle, permitting easy manipulation of the stream in any direction.

Gardeners desiring to apply this principle to lighter hose can do so by fastening a stick to the nozzle and wiring it back of the hose line about two feet.

Inhaler Aids Asthma Patients

A NEW inhaler devised for the relief of asthma was shown at the International Chemists' Exhibition, London, England.

Inhalants are placed in an electrically heated compartment, and the fumes pass through a tube to a cup formed to fit the nose and mouth of the patient. The electric fan, which drives the heated vapor, and the breathing cup eliminate clumsy hoods formerly used to concentrate fumes.

The patient fits a cup over mouth and nose to inhale healing gases passed from machine through hollow tubing.

The AUTOGIRO--How and Why It Flies

Marvel of modern aviation, the autogiro can take off in 15 to 30 feet, fly safely at 15 m.p.h., descend vertically, stop in mid-air without danger and land in the average back yard. It cannot stall, spin, or crash from motor failure and has no ailerons, rudder or lifting surfaces other than the rotating vanes.

Senor Juan de la Cierva, inventor of the autogiro. The stalling tendency of early planes prompted the idea of rotors, or freely revolving wings.

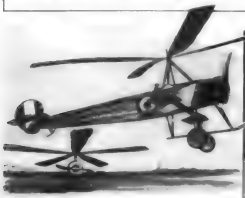
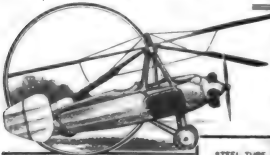


Fig. 1.

FIG. 2. FIRST ATTEMPT TO MECHANICS ROTOR STARTING

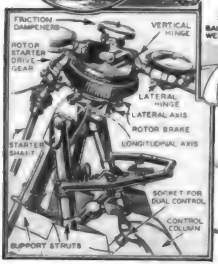
Early attempts to fly the autogiro were not successful. Gyroscopic action set up by the whirling rotor capsized the ships before they got into the air. Cierva finally articulated the rotor blades and overcame this difficulty. In the drawing above one of the first crude but successful ships is shown in flight. On the ground is an unsuccessful four-bladed model with fixed vanes. Absence of ailerons on latter indicates Cierva's early belief in principle of direct control, used in autogiros today.

Drawings above and to the left show early methods of setting rotor blades in motion. Fig. 1—Taxiing around field to pick up required speed. Fig. 2—Speeding up rotors by cable and drum. Fig. 3—Deflecting the propeller slipstream to rotor blades from surface known as a "starting tail."



The 1929 ship at left shows position of blades when not in motion. Note also starting tail shown in Fig. 3. Blades are hinged and free to move up, down and a limited distance in direction of travel to avoid breakage.

DIAGRAM SHOWING HOW RIGID WINGS AND FLEXIBLE BLADES COMPARE IN ROUGH WEATHER



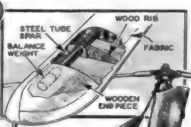
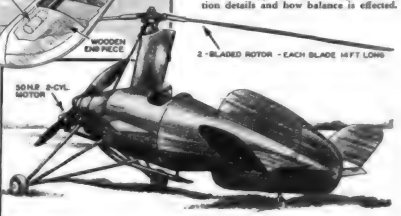


Diagram above shows action of plane in bumpy air. Left, a cutaway view of the latest type blade showing construction details and how balance is effected.



Tilting the rotor forms the sole means of controlling an autogiro and necessitates the complicated hub shown at the left. No other rigging is employed to support the blades. Right—A one-place autogiro now in production, equipped with a two-bladed rotor. This ships weighs 610 pounds with a full load and will fly at about 95 m. p. h.

Screen Star Is Co-inventor of New Night Light for Pistol

WARNER BAXTER, screen star and sportsman, is the co-inventor of a gun light that takes the guesswork out of night shooting.

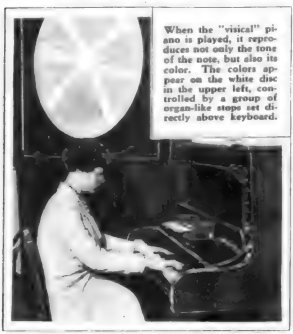
The device consists of a battery and a pen-sized flashlight mounted on either side of a metal saddle moulded to fit either the automatic or six-shooter style barrel. Spring clips hold the saddle in place.

When used at night, a small slide on the battery case is pushed forward, and the bulb throws a narrow beam of light through the darkness. When the light encounters the desired target, the trigger is pulled. An officer, using the gun, should be able to hit any target which the light illumines.

California state police officials commented favorably on the possibilities of the light. It will be a boon to raccoon hunters who are forced to hunt their quarry in the dead of the night.

Warner Baxter shown with his night light for pistols. Observe the battery and light set on metal clip saddle.

New Piano Plays Music in Colors



When the "visical" piano is played, it reproduces not only the tone of the note, but also its color. The colors appear on the white disc in the upper left, controlled by a group of organ-like stops set directly above keyboard.

A "VISICAL" piano—one that not only plays notes but also reproduces them in color—was one of the featured exhibits at the recent Inventions Exhibition at Central Hall, London, England.

The piano is ordinary in respect to appearance with the exception of a group of levers resembling pipe-organ stops above the keyboard.

As the instrument is played, vari-colored lights, corresponding to the notes, appear on a white disc hanging near by.

Each note has its own distinctive color, resulting in beautiful blends when specific cords are struck on the keyboard.

Device Telegraphs X-Ray Photos

A NEW X-Ray machine which reveals even the most obscure bodily parts and shows the blood vessels in their natural color, was recently patented by Luther G. Simjian, former department head of the Yale medical school.

Coupling this machine with telegraphic wiring makes it possible for men hundreds of miles away to study a patient before the X-Ray. Contrasting colors clearly define the points where organisms begin and end.

Pistol Grip Will Hold Saw File

A NEW pistol-grip holder for saw files now allows a firm grip on the file, aids the user in guiding his stroke, and eliminates, to a large degree, chewed fingers resultant when the hand slips from the file. The file fits firmly into a hole in the handle.

Set screw holds file firmly in pistol grip. Note bar guide.

Relatives hopefully awaiting the return of the rescue crew from the Carolina Coal Co. mine at Coal Glen, N. C. Forty-eight miners were trapped by an explosion.

Mechanical Watchdogs

by
ARTHUR BRADBURY
Supt. Mine Rescue Station, Belleville, Ill.
as told to
ROBERT A. HEREFORD

Superintendent Bradbury is shown at left demonstrating the breathing apparatus he uses in mine rescue work. He is in charge of one of Illinois' eight rescue stations. Five miners work with him during disasters.

AT 8:15 o'clock on the morning of December 24, 1932, a crew of about a half a hundred miners was busily at work in the depths of the Moweaqua Coal mine near the little town of Moweaqua, Illinois. Other miners were engaged in various tasks near the surface of the mine and at the entrance. The picks and shovels that bit away at the coal-lined walls in the black depths of the earth flew a bit faster and hearts were light for it was Christmas Eve and the thoughts of the men were on the happy events of the morrow.

Suddenly the faces of the men near the entrance of the mine went white under their covering of grime. From the cavernous mouth of the mine entrance came the rumbling roar of a mighty explosion.

Explosion Traps 54 Miners

Miners near the surface came scurrying up to safety. Then there was an awful silence as the minutes dragged by with no sign of the 54 men who had been at work at the bottom.

Word of the explosion spread like wildfire through the little town of Moweaqua. Like magic the ever vigilant mine rescue crew with its extensive equipment appeared on the scene.

Taking safety lamps and donning their oxygen breathing apparatus as protection against the deadly "afterdamp," the miners' name for the poisonous gases formed by an explosion, several members of a rescue crew went down into the mine to determine the fate of the missing men. Others remained in readiness with their oxygen inhalators for reviving men overcome by gas

At left—Miners at work in a coal mine. Their safety lamps detect gas but when defective often cause explosions. At right—A rescue team is shown at drill in a Utah mine. Their gas proof helmets resemble those worn by undersea divers.

of the COAL MINES

and smoke and with stretchers and first aid kits and supplies.

It was not a pleasant report that the rescue crew brought back. The terrific explosion, apparently caused by the igniting of mine gases, had released a fall of rock and slate that choked up the mine passage and cut off the imprisoned miners from the rescue crew.

Experienced heads realized that there was little chance of saving any of the entombed men who might have survived the explosion and the cave-in. When the barrier of rock and slate was dug away their worst fears were realized. Under the fall of rock, battered and burned by the explosion, and suffocated by the deadly gases that followed the blast, the bodies were found.

Record Disaster Killed 361 Men

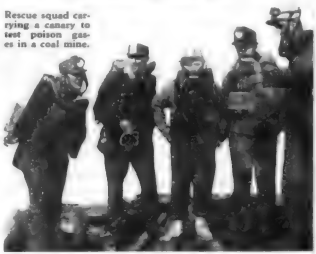
All night Christmas Eve, all day Christmas, and for several more days of the holiday season a faithful little group of women, wives of the entombed miners, kept their pathetic vigil at the mine entrance until the last of the 54 bodies were brought up. The explosion is believed to have been set off when flame from a miner's open lamp ignited gas.

The greatest loss of life in a mine disaster in this country occurred in an explosion at Monongah, West Virginia, December 6, 1907, when 361 were killed. On October 22, 1913, 263 miners died in an explosion at Dawson, New Mexico. The third greatest loss of life in a mine disaster occurred at Cherry, Illinois, on the fatal November 13, 1909, when 256 miners were burned to death in the St. Paul Coal Company Number 2 mine. A kerosene lamp which ignited hay being taken to the mule stables is believed to have set off the fatal blaze. Another large loss of life occurred at Braidwood, Illinois, February 16, 1883, when 69 men were drowned by surface water which flooded a mine.

Among other causes of mine fatalities are explosions of powder used in blasting coal; suffocation, and the fall of cages and buckets, but gas and dust explosions have been responsible for most of the country's greatest mine disasters.

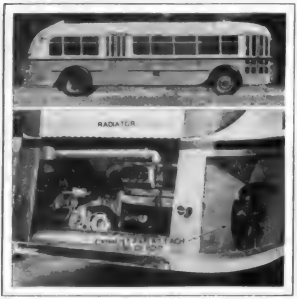
Coal consumers may not realize as they sit by their cozy grate fires or comfortable radiators the risks taken by the men who go down into the depths of the earth to bring them up warmth-giving fuel. In the

(Continued on page 120)



Rescue squad carrying a canary to test poison gases in a coal mine.

Streamlined Coach Features Rear Mounted Diesel Engine



Above—General side view of coach showing driver's cab in extreme front. Below—Exposed view of rear end. Note radiator directly above the motor, and side exhaust fans.

A NEW stream-lined coach, featuring an engine transversely mounted in the rear, now make it possible for bus manufacturers to use the Diesel engine. Hitherto, exhaust fumes which sifted into the coach annoyed the passengers, and made the use of a front mounted Diesel impractical.

The coach is uniquely ventilated by a scoop-like duct built into the roof which sucks in the air as the coach moves forward, at the same time setting up a suction which pulls air from the passenger compartment through connecting ducts in the roof.

Transmission and clutch are mounted together with the engine in the rear and are operated by remote control from the driver's seat. The whole unit is placed in a dust proof compartment. Air entering the motor housing from the roof first passes through an oil wash air cleaner.

Coin Buys Fountain Pen Refill

A NEW fountain pen "filling station," recently put on the market, is designed to provide ink to anyone at one cent a refilling.

When refilling, old ink can be drained into a conveniently located reservoir in the machine. A coin is then inserted into the slot, automatically releasing the control bar. Pressure on the bar uncovers a small circular opening through which the pen is inserted for refilling.

If desired, this device can be used in offices with the coin arrangement disconnected.

Photo shows girl refilling fountain pen after she has inserted coin in the new automatic ink vending machine.

Valve Grinder Is Air-Operated

This photo shows the compact, air-operated valve grinder connected to the conventional air line commonly used for inflating tires. The speed of the grinder increases as the user applies the pressure and decreases as the pressure lessens. When lifted from valve, the grinder stops.

WITH the invention of the new air operated valve grinder, a new use is found for garage and filling station air lines during the times they are not being used for inflating tires.

The valve grinder, a light compact mechanism, can easily be connected to the air line. Its action is automatic; the speed of the motor increases in proportion to the pressure as it is applied by the mechanic. As the pressure is decreased, the grinder slows up, and when lifted from the valve it stops operation entirely.

Where it is found advisable, auxiliary air lines may be installed solely for the purpose of running the grinder.

Aero-Drive Desert BUS Replaces Camels

Cross-section of new desert travel ship, showing construction of inflated spherical rubber tires and mounting of motor. Brakes on front and rear wheels are independently controlled, permitting their use in steering the huge bus.

PROTECTED from tropical sand storms, desert travelers of the future may be able to whiz across the Sahara in monster 100-passenger aero-drive buses following radio beam highways. Camel caravans would be out-moded by the standard of comfort possible in the proposed buses.

Preliminary details of this whirring, bouncing giant of the sands call for propulsion entirely by air, with a 2500 h.p. aviation engine and pusher propeller mounted atop the roof. Most unusual feature of the desert bus is a series of spherical tires on each side which would provide good traction over the shifting sands. Directly back of the propeller is a steering fin which controls the direction of the ship.

Get More Furs

by **ROBERT PAGE LINCOLN**
Hunting and Fishing Editor

TRAPPING SECRETS

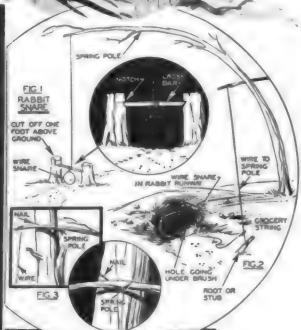
TRAPPING is one of the great sports of the outdoors that brings profit, as well as pleasant days in the open. To be a successful trapper one must know the habits of animals and be able to match their cunning.

Although winter is the trapping season, it is easier to trap along open streams and lakes than in the snow. The expert trapper overcomes the difficulty of snow by carefully selecting spots for his traps and skillfully hiding all traces of his visit to those places.

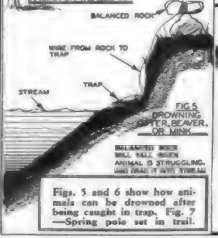
The No. 1 single spring trap is one mostly used for mink, muskrat, skunk and animals of similar size. Double jawed traps prevent the animal from breaking or gnawing off the foot and escaping, while more humane traps kill the animal after it is caught.

Few trappers realize that a new trap has a strong smell that can be detected by animals. To get rid of this steel odor the traps should be buried in the earth for about ten days. This is a trick of trapping that often is not known by even the most expert.

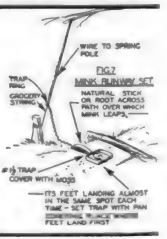
If open water occurs on a stream where one is trapping aquatic animals, such as the mink and the muskrat, the method of using a slide wire to drown the animal upon capture is suggested. It is humane, and helps to put the animal out of misery. The method involved in using the slide wire is illustrated in Fig. 6. The wire used, on which the trap ring is arranged, can be a



Figs. 1-3 show the use of snares with spring poles. In Fig. 4 the snare is replaced by a steel trap. When animal is caught, its struggles release the pole. String holding the wire should be weak to break easily.



Figs. 5 and 6 show how animals can be drowned after being caught in trap. Fig. 7 —Spring pole set in trail.



by Matching Animal Cunning

copper wire or a steel wire of about 20 gauge. As shown in the illustration, a trap has been set in a runway along the bank. A stone with the wire attached has been placed in the stream, while the other end is tied to a root or stub on the bank. The trap ring is on the wire. Upon capture the animal's first impulse is to leap into the water. Doing so the trap ring slides down the wire to the stone, the weight of the trap holding the animal under water and drowning it.

Balanced Rock Drowns Animal

A clever method of drowning an animal, especially an otter, is in vogue among the Indian trappers of the north. It consists of attaching a wire to the trap ring and in turn fixing the wire to a stone balanced on another stone on the bank above. A glance at Fig. 5 will show definitely how this is done. When the otter or beaver is taken in the trap, its struggles will dislodge the balanced rock. The rock will roll down the bank and plunge into the water, carrying the trap and animal with it.

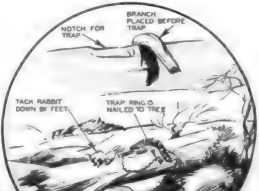
The method of using a springpole in connection with trapping animals the size of mink and weasel is shown in Figs. 2 and 4. A sapling is bent over and held in such a way that when the animal is taken it will dislodge the sapling, causing it to jerk erect, carrying the trap and animal with it. Two methods of arranging the springpole are shown in Figs. 1, 2 and 3.

One method involves placing a headless nail in a tree, under which the springpole is lodged. When the animal struggles, it will dislodge the pole. The other method involves pulling the springpole wire down and tying the trap ring to a stub with a grocery thread of not too strong grade. The trap ring is, of course, also attached to the wire. The struggling animal breaks the grocery thread releasing the springpole.

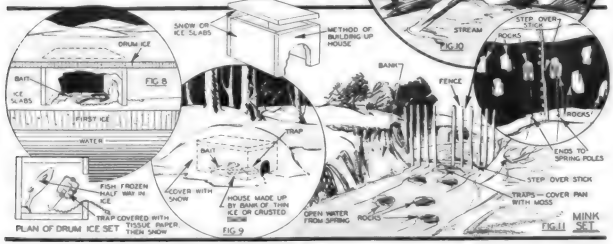
Figs. 1, 2 and 3 also illustrate excellent snares using the spring pole. This method of snaring is much used in the north, both by the Indian and white trappers. It can be used to deadly effect in the snaring of rabbits. This animal, as is well known, makes beaten tracks in the snow, which are followed by all rabbits in the neighborhood.

Go along the rabbit trail until two saplings are found growing close together, between which the trail leads. The saplings are cut off a foot or so above the snow, after which notches are made on the inside of the stubs. Cut a crossbar to slip into the notches. To the center of this cross-piece the springpole

(Continued on page 126)



An ingenious set can be placed between first ice and drum ice of stream or on bank as shown in Figs. 8 and 9. Fence in Fig. 11 forces mink to leap into trap. Same idea is used on log over stream, shown in Fig. 10.



Learn Proper Methods of Curving and Waxing Skis

IN MAKING new skis or re-shaping old ones that have lost their springy center, it is necessary to give them a steam bath, in a box especially made for the purpose, so that the points and centers will curve when pressure is applied.

This box is neither complicated nor expensive, as it is merely a square tube constructed of six inch lumber which should be built a foot or two longer than the ski to be bent.

After the form is completed, the ski is inserted, and the open end of the tube is held over the steaming spout of a tea-kettle. Although greater concentration of steam hastens penetration of the wood, a small opening must be left in the top of the tube to permit circulation.

After a steaming of several hours, the ski should be ready for removal and shaping. To shape the center curve, a block of wood is set under the ski in the middle, and both ends are fastened to the floor. Tips are shaped by running wires from the points back one-fourth the length of the ski.

If the ski is an old one in which the curves have disappeared, the varnish must be rubbed down or scraped off before administering the steam bath. An old ski being reshaped should be left under the steam twice as long as a new ski.

Generally, the groove in the center of the running surface of the ski is not deep enough. A groove a half inch wide and approximately one-fourth inch deep is suggested. Instead of being triangular, the groove should be cut in a semi-circular shape. This permits a better grip on the snow and improves the running surface considerably.

Few ski enthusiasts wax their skis; few of those that do so wax them properly. Waxing a cold ski is futile, as the wax does not penetrate the wood. The correct way to do this is thoroughly to heat the ski at a stove or a furnace, giving it a moderate —never an intense—heat. Then rub in the

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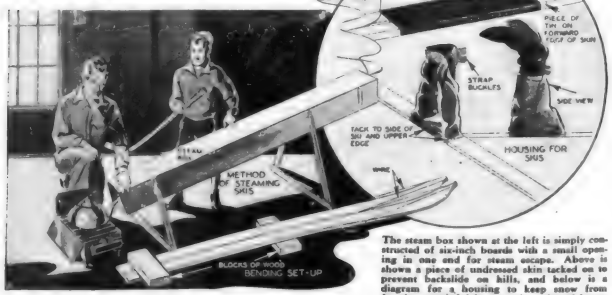


The steam box shown at the left is simply constructed of six-inch boards with a small opening in one end for steam escape. Above is shown a piece of undressed skin tacked on to prevent backslide on hills, and below is a diagram for a housing to keep snow from forming a painful lump under soles of boots.

Selecting Bait and Good Fishing Spots During Winter

THE great northern pike in the north and the pickerel in the eastern part of the country are two of the most active winter fishes. They do not hibernate, but seek food through the entire season of snow and ice.

In the rivers and streams where both of these species are found, they are generally most numerous in the deep holes and pools. In lakes you will find them operating at regular times through channels from one lake to the other. Generally a hole cut to fish through at the entrance to a channel will result in good fishing for either great northerns or pickerel.

Chubs, shiners and mud minnows make excellent great northern pike lures. Those six to ten inches in length are the best. Perch, six to ten inches long, are also excellent, because the perch is one of the chief foods of the great northern pike. A method of making a hook arrangement to hold a large perch alive on the hook is shown in the illustration. It involves applying a wire to the hook and working it under the skin of the side of the perch. This method seldom fails to hook a pike. Use an 18-gauge steel wire and solder it to the eye of the hook.

Minnows Lure Wall-Eyed Pike

Never attempt to land a great northern pike before it is worn out. Let it make a run, keeping the line taut. When the fish slows up, work him in. When he runs again, let him have line. In this way he will eventually wear himself out. This is the best course to follow especially if the pike is a large-sized specimen. Some very large pike are taken in the winter, larger in fact than during the summer.

While the wall-eyed pike does not go into complete hibernation in the winter, they do not move around a great deal. They can be taken by hook and line, however. You will find them in some of the very deepest holes in the lake you are fishing, right down on the bottom. Large minnows let down to lie flush on the bottom are likely to stir the wall-eyes into activity.

The black bass likewise seek the deep holes in a lake, especially among the caverns and rocks on the bottom. Where such are found in deep water you can always expect to find bass. They do not go into a complete dormant torpor, but lie on the bottom, barely moving. If a bait comes within range they will almost be certain to take it. Most of the fishing done in the winter is in comparatively shallow water. If more fishing were done in the deepest of water, right down near the bottom, other fish besides croppies and perch would be taken.

The use of a wobbling spoon in winter fishing, jerking the same up and down in the water, a foot or so at a time, often proves a deadly means of taking pickerel and great northern pike. Whitefish can be caught close to the bottom of a lake with white pork or grub worms as bait. Use no sinker on the line.

By dropping minnows through hole in ice, as shown at extreme right, wall-eyes can be drawn to baited hook. Use spinner and hold line between fingers when angling for lake fish. When using perch as bait for great northerns, solder wire to hook and slip under side skin of fish as shown in circle.

Police Turn Cameramen on Crash Prevention Squad

Officer Geo. Collins points out scene to be photographed as Don Verkler, seated below, manipulates the camera.

IN a drive to prevent accidents, the Chicago police department has recently added a squad of twelve cars to cruise the city with the sole purpose of investigating traffic accidents.

Each squad car is equipped with camera, radio, first aid kit, measuring devices and brake testers, and will cruise in its own section of the city only to be called upon to visit crash scenes.

Upon call, they rush to the accident, administer first aid, if necessary, and then go about collecting evidence for probable civil or criminal trial. Photographs from all angles insure impartial testimony.

Officials say that the Accident Prevention squad is a permanent addition to the force.

Reverse Signal Warns Motorists

AN ELECTRICAL unit, that automatically sounds the horn and illumines a warning signal in the rear when the automobile is shifted into reverse, was one of the featured inventions at the Automotive Exhibit, Central Hall, London.

The unit operates from an ordinary storage battery. It is so wired that the shift rod, when thrown into reverse, depresses a button completing a contact which automatically sounds the horn and starts the red warning signal in the rear.

The device will avoid many unnecessary collisions when parking an auto in congested down-town areas. The combined warning will keep other motorists from drawing too close to a machine stopped for parking.

Dr. W. L. Goodfellow, inventor of the warning, believes that it will not only save repair bills for bashed fenders, but will also minimize harsh feelings between motorists.

This device, exhibited by Dr. W. L. Goodfellow, inventor, is an electrical unit which sounds the automobile horn and illumines a warning signal in the rear when the car is shifted into reverse gear. The inventor points to the button which completes contact.

Adjustable Table Has Two Legs

Two steel, adjustable legs support the front end of this odd table. The rear is supported by user's lap, as shown.

A REVOLUTIONARY table, dependent upon two legs and a lap or armchair for support, was recently perfected by a Florida inventor.

The table is light and portable, weighing only six and one-half pounds. It is especially designed for use as a lawn and picnic table. The adjustable front legs can also be shortened for use in the rear seat of an automobile.

Extra equipment includes a reading rack that clamps to the outer edge, and four short wire legs which, when attached to the corners, create an ideal bed table for serving meals to invalids.

Red Light Glows in Clock Face to Summon Cruising Police

THE glowing rays of a red light placed in the "old town clock" tower, now makes it possible for two policemen equipped with an automobile to patrol the whole city of Baker, Oregon.

Hitherto, Baker's two policemen were confined to a beat on the city's two main thoroughfares, due to the fact that they had to remain within hearing distance of telephones located at various places for police-communication.

Under the new system, when leaving to patrol the city, the police switch the phone connections so that the firemen receive all calls. The firemen, upon receiving a call, push a button switching the current from the white to the red globe in the clock tower, thus summoning the watchful patrolmen who report to the station or call in to locate the source of the trouble.

Patrolmen of Baker, Oregon, are called in when trouble occurs by a red light burning in the old clock tower.

Novel Straws Resist Rough Use

A CELLOPHANE drinking straw that has all the good properties of a glass tube and yet is produced cheaply enough so that it may be thrown away after using has recently been invented.

Cellophane straws are built transparent and very tough.

This straw is transparent and is so smoothly finished on the inside that it reduces frictional agitation with consequent decarbonization of the drink to a minimum.

The strength of the new straws will make it popular when thick beverages are being served.

Welding Pliers Hold Break Rigid

THE newest in mechanics' tools is a plier designed to hold broken steel edges in alignment while they are being welded.

The pliers fit around the break and, when closed, pull the broken edges together. A handle lock keeps the tool in place while welding.

Welding pliers hold together broken edges of auto fender.

Kite Powered Net Traps Insects

HUGE and intricately designed kites, with nets attached, now soar high over the city of Hull, England, as Hull University scientists attempt to discover what species of insects the wind carries into England from abroad.

The kites are over ten feet high and approximately eight feet wide, tapering gracefully at both ends. Contrary to the conventional child's kite, they have no tails. The tails are supplanted by reinforced holes in the kite's surface. The air rushes through the holes, creating a suction behind which supplies perfect balance.

The nets are controlled by chemical fuses and can be opened or closed at will, making it possible to determine the exact height at which the insects travel.

It is expected that this net will prove invaluable in the study of insect migration. Scientists in all parts of the world are watching the progress of the tests.

Photo shows kites which pull nets to catch insects. Note the holes in the kites which compensate for lack of tail.

Phone Holder Permits Use of Hands During Conversation

Photo shows the countess of Oxford and Asquith testing phone holder which allows use of hands during conversation.

A NEW telephone holder which leaves the hands free during conversation was shown at the Inventions Exhibition in London by its woman inventor.

The holder is simply set up and consists of a rod, set in the base of the telephone, a spring controlled lever to hold the bar in place when the phone is not in use, and a rigid wire with a clamp on either end which supports the telephone at the desired height on the upright rod.

The clamp on the support rod has a set screw, making it possible to slide the supporting arm up and down for the comfort of the user. The phone holder is designed for use by people transcribing spoken messages on typewriters.

To Cast 200-Inch Telescope Mirror

PLANS to cast another 200-inch telescope mirror, an exact duplicate of the mammoth reflector cast last March, were announced recently by the Corning glass works. The new mirror is to be constructed as a substitute for the original. Both have the capacity of seeing 4 times farther than the largest telescope extant.

The only changes in the making of the new mirror will remedy several small errors noted in the casting of the first.

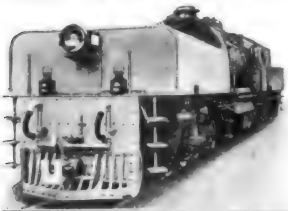
Swinging Files Add Efficiency

ENGLAND'S latest contribution to office efficiency comes in the form of a turntable letter tray containing three shelves, each of which swings back and forth in an 180 degree arc.

The trays are suspended from a chromium pillar and are easily available without disturbing the man at the desk.

Files swing on chromium pillar which clamps to rear of desk.

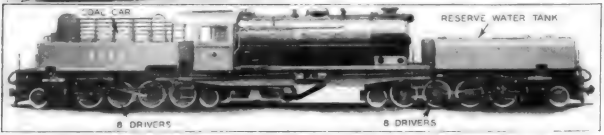
German Engine, Unable to Turn in Mountains, Has Two Front Ends



SINCE it is impossible to turn an engine in the rocky, narrow passages of the Harz mountain line, German locomotive engineers were forced to build an engine with two front ends.

The boiler and cab are set between the coal car and the reserve water tank which is always necessarily carried due to the inaccessibility of water in the mountains. The engine boasts sixteen drive wheels—eight of them on either end of the engine.

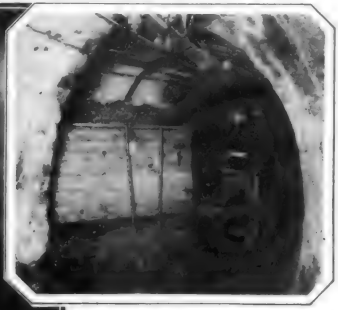
It is strange to the American trained eye to see no wheels under the boiler.



This engine was designed by German engineers for use in the Harz mountains. Since it is impossible to turn the engine in passes, the engine has two front ends with eight drivers each. Due to lack of water, reserve tank is carried.

Exploring Chicago's SUBWAY SYSTEM

A rear view of one of the 150 electric locomotives that keep Chicago's package freight moving through a 62-mile tunnel system directly beneath the busy Loop streets.



The cinder train above serves large buildings and diverts this traffic from busy downtown streets.

Photo shows one of the many intersections in the Chicago subway. A train dispatcher controls all the car movements.

by **FRANK MATE**

FORTY feet below the surface of Chicago's teeming Loop lies an amazing transportation system unknown even to a large portion of the city's inhabitants—the 62 miles of connecting tunnels which comprise Chicago's little publicised subway.

Originally built to carry telephone and telegraph cables, the tunnels are used today largely for the transportation of package freight, plus occasional loads of coal and refuse material.

Sturdy electric locomotives supply the motive power for the subway transportation system, which is run with the efficiency and dispatch of a surface railroad organization. A train dispatcher in a central station controls all train movements. He has 266 telephone connections and keeps a dispatcher's sheet showing all train movements and their locations.

The tunnel rolling stock comprises 150 electric locomotives and about 3300 freight cars of all classes. The ordinary car, fitted with a stake-and-band body, is about four feet wide and twelve feet long. Each of these cars will carry from one to six tons of freight, depending upon the nature of the commodity.

The volume of freight carried by the subway railroad varies, but there is an average movement of about 300 trains a day, each of which is comprised of from 10 to 15 cars. It has been estimated that this tonnage would necessitate more than 5000 truck movements through the crowded Loop.

There are 3800 lights in the tunnels which illuminate the 734 intersections and places where lights other than those carried by the trains are needed. A signal system protects the trainmen when delivering freight or switching cars.

The tubes are about six feet wide and 7½ feet high. The walls are shaped like a horseshoe and are faced with concrete a foot thick. There has been no perceptible settling nor disturbance of adjacent building foundations.

Oregon Man Builds Flapping Wings for Mountain Gliding

With these strange flapping wings and steering tail Joe Fodie, of Rowena, Oregon, hopes to leap into space, glide safely to earth on man's first flight under own power.

WITH only a pair of strange cloth-covered wings strapped over his arms, Joe Fodie of Rowena, Oregon, hopes to glide through space by the power of his arms alone, after jumping from a mountain top precipice. Should this intrepid inventor glide safely to earth, it will be the first time man has flown through the air under his own power.

The queer wings are hinged at their center, with a stop to prevent them from buckling upward. As the arms are moved upward in flight, the outer halves of the wings would naturally fold inward; on the downward stroke they flatten out again, providing lifting power. Fodie designed his wing action to resemble as closely as possible the flapping motion characteristic of a bird in flight.

Clocks of World on Phone Board

PERHAPS the most unique of telephone switchboards in the world is that at Honolulu, Hawaii, where much of the telephone communication between the islands themselves and the rest of the nation, 2200 miles away, is conducted by means of a wireless system.

Before the operator of this "around-the-world" switchboard are seven clocks, showing the correct time in various sections of the United States, in the Philippines, and in other parts of the world. Knowing the regular business hours in the different localities, the operator can tell at a glance whether a call can be put through to a business firm in a certain time zone within regular office hours.

On this "around-the-world" switchboard at Honolulu, Hawaii, are clocks for various time zones to which phone calls are put. Short wave radio is used for most communications.

Welder Creates Metal Statuettes

James Dewey, welding sculptor, is shown creating novelty ash trays from white-hot metal, using oxy-acetylene torch, welding rod, and pliers in place of mallet and chisel.

USING a welding torch in place of a chisel, James Dewey, 23 year old welding engineer of Sierra Madre, California, creates amusing figures in white hot metal.

Bit by bit the little statuettes are built up, as an oxy-acetylene torch releases drops of molten metal from the welding rod. A metal ash tray is generally used as a stand for the figures.

In this unique method of sculptoring, metal can always be added at any part of the model, but is very difficult to remove. Should too much metal be placed anywhere, it must be removed with an emery wheel or file before the figure can be completed.

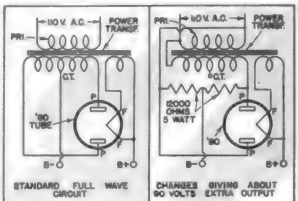
Radio Power Pack Changes Increase Output Ninety Volts

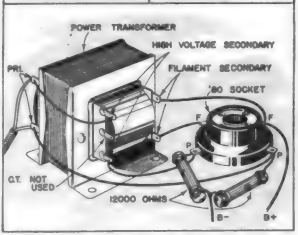
HERE is an inexpensive method of increasing the voltage of your power pack by at least 90 volts. First, of course, determine your filter condenser ratings to see if they will stand the added voltage. If not, they will have to be changed.

Old and new power pack circuits are shown at the right. The power pack transformer is connected as an auto-transformer, and primary and secondary voltages are thus added together. An artificial center tap, made up of two variable or fixed resistors, now replaces the secondary center tap connection.

Carbon pile variable resistances will permit a more accurate adjustment of the new center tap, since fixed resistors are seldom exactly the same value.

When using this power pack connection, a small capacity fixed condenser must be placed in series with the receiver ground, or no ground connection used at all. This is necessary because the negative side of the power pack output is now directly connected to the power line.

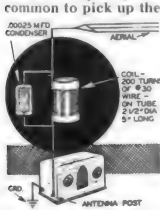




Auto-transformer connection shown above for power pack transformer gives 90-volt increase in output. Connections are made to center tap resistor as shown in lower drawing. If 10,000 ohm rheostats are used in place of the resistors, they can be adjusted to exactly same value with voltmeter.

Filter Short Wave Interference

ON MANY modern midget superheterodyne receivers it is very difficult to eliminate signals from nearby short wave transmitters operating on or near the intermediate frequency of the set. It is quite common to pick up these naval, airport, or commercial stations regardless of where the set is tuned on the broadcast band.

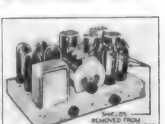


Condenser-coil filters out interference between 480 and 230 KC.

The easiest way of eliminating this annoying disturbance is to place a tuned filter in series with the antenna lead as shown in the sketch at the left.

Remove Shields for More "DX"

REMOVING the shields from screen grid tubes in your set will often give it regenerative qualities, bringing in many more distant stations. Tuning will be far more sensitive than before.



Remove the screen grid tube shields, then replace grid leads.

HITCH-HIKER'S

Hitch-hiker's radio is ready for use when insulated aerial is tossed into a tree.

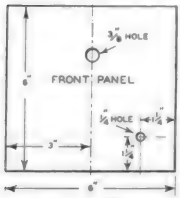
Weighing only ten pounds complete with batteries, this compact portable receiver with built-in loudspeaker brings in local and distant stations with surprising clarity and volume. Toss the aerial wire into a tree and it's ready for operation.

TO THE camper, the wandering hitch-hiker, the canoeist, or the boating fan this lightweight two-tube receiver, bringing in distant as well as local stations on the built-in loudspeaker and short-wave stations on headphones, will prove a welcome traveling companion.

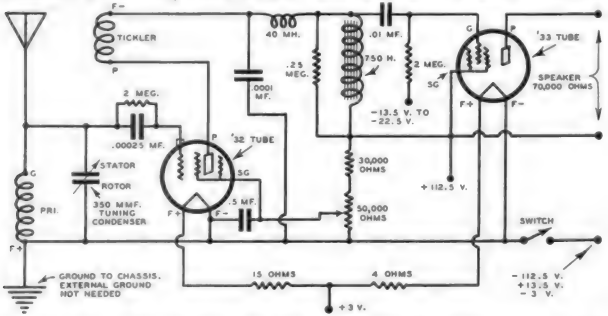
Where battery box and receiver are connected by a four-wire cable, only one connection, that to an aerial, need be made to get the set in operation. Twenty-five to fifty feet of copper wire, with enough stout cord to pull one end over some nearby tree, will serve admirably as an antenna for this set. The metal chassis, acting as a counterpoise when the set is near the earth, makes a ground connection unnecessary.

A type '32 screen grid detector tube and type '33 power amplifying tube are used in this set, regeneration being controlled by a potentiometer.

The set is built into a 6"x6"x6" electralloy or aluminum shield can, which houses everything but the batteries. It will operate at a cost of about a cent an hour from flashlight batteries. At home, two dry cells



Front panel layout of set is shown at left. If special vernier tuning dial is used, or airplane type dial, other holes may have to be drilled. If ground wire is used, it may be connected to metal chassis at any point. In many cases, however, better reception is obtained without any ground. Long aerial is needed for short-wave reception—this should be mounted very high.



Schematic circuit diagram of two tube portable battery receiver is shown above. When headphones are used, connect in place of the loudspeaker. Jack may be mounted on front panel if desired, connected so either headphones or speaker can be plugged in without taking cover off set. Mount small resistors and condensers at points convenient for easy wiring.

2-Tube Portable Radio

may be used instead, at a cost of about a cent for three hours.

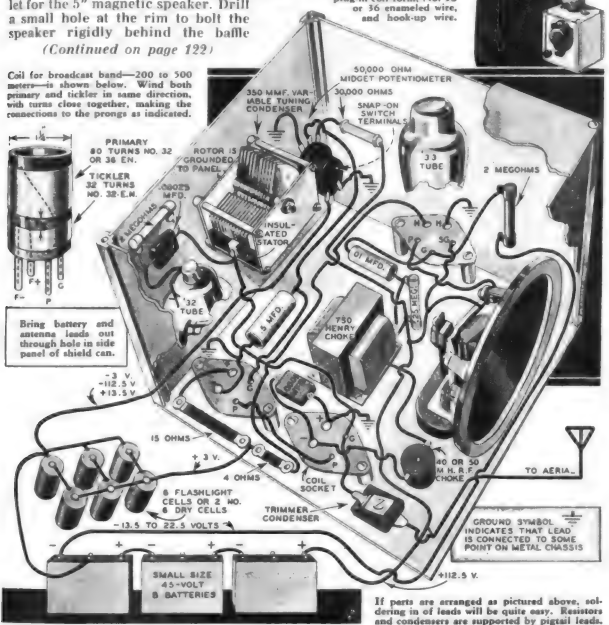
The aluminum shield can comes knocked down but is easily assembled. Bottom and top screw on, and sides are held in place by channel grooves in the corner posts into which they slide. Solder and bolt a screen door handle or a drawer pull to the top lid for carrying. Drill the front panel to take the dial, carefully following the template shown in the drawing.

The shaft of the potentiometer is insulated from the panel with a fiber bushing. A hole 4½" in diameter is cut in the back side of the chassis to provide a sound outlet for the 5" magnetic speaker. Drill a small hole at the rim to bolt the speaker rigidly behind the baffle

(Continued on page 122)

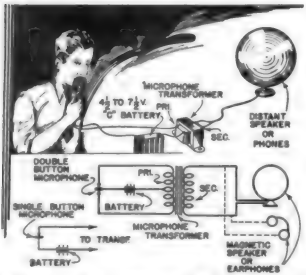
PARTS LIST

Variable cond.—350 mmf.; antenna trimmer cond.; 50,000 ohm midget volume control potentiometer with snap-on filament switch; 750 henry a.f. choke; 60 mh. r.f. choke; 2 four-prong wafer sockets; 1 five-prong wafer socket; vernier tuning dial; volume control knob; one-watt carbon res., 30,000 ohms, .25 megohms, two 2.0 megohms; wire-wound res., 4 and 15 ohms; mica cond., .0001, .00025 mfd.; tubular cond., .01, .5 mfd.; 5" midget magnetic speaker; '32 and '33 tubes; batteries, shield can, plug-in coil form, No. 32 or 36 enameled wire, and hook-up wire.



If parts are arranged as pictured above, soldering in of leads will be quite easy. Resistors and condensers are supported by pigtail leads. Trimmer condenser is adjusted for maximum volume only when coils are changed. Three plate vernier condenser may be mounted on front panel in its place.

TESTED RADIO SHORT-CUTS



Amplifier Works Without Tubes

PUBLIC address and inter-office communication systems giving loudspeaker volume without the use of any tubes can be set up by any radio experimenter.

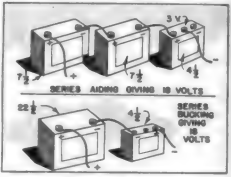
The tube-less amplifier in its simplest form consists of a carbon microphone coupled through a microphone transformer to a magnetic speaker.

The transformer is a standard "mike to grid" type selected to match the microphone being used. A center-tapped primary is necessary if a double button microphone is to be used. The battery voltage is, of course, that recommended for the particular microphone at hand.

This amplifier will work with headphones as a "hard-of-hearing" aid.

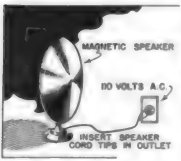
Connect C Batteries in "Series Bucking"

WHERE radio set specifications call for an odd value of grid voltage which cannot conveniently be built up by connecting small units in series, keep in mind this kink. Instead of connecting the batteries in series *aiding*, where the voltages of all cells add together, use a series *bucking* connection. Here one or more cells are connected in series with polarity reversed, these voltages being subtracted. In the example at the right, the use of this bucking connection allows two batteries to replace the three ordinarily required to give 18 volts.



Check Magnetic Speakers With 110 Volts A. C.

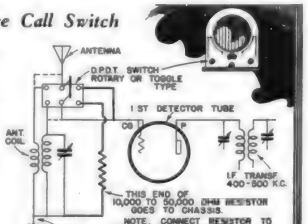
A MAGNETIC speaker can be checked for an open winding by plugging it into a 110 volt A.C. line. The speaker will produce a steady 60 cycle hum if the winding is good. When the speaker chatters, the armature is striking the pole piece, and should be adjusted. Two speakers can be compared for efficiency on low frequencies by comparing their hums on A.C. No damage will result, since the windings have a high impedance.



Add a Police Call Switch

POLICE calls, aviation and some amateur stations can be brought in on many radio receivers merely by installing a single switch and resistor. The method is applicable to midget and standard size super-heterodyne sets having an intermediate frequency of about 456 kilocycles.

By using a double pole double throw switch connected as in the diagram at right, the set can instantly be changed over from broadcast to short wave. Dotted lines indicate the original set connections, and heavy lines the new connections. Short wave programs are received with the switch thrown to the right.



NEEDED INVENTIONS

Annually, one billion dollars are paid to inventors. New inventions are not essential. Practical improvements, suggested in this article, are money makers.

AN AUTHORITY has recently calculated that nearly one billion dollars is paid out each year for royalties on patents in the United States alone. Some of our inventors receive as much as $500,000 annually and, in rare cases, royalties have been known to reach over one million a year. Such are the stupendous opportunities faced by the men who would improve the world, and there is little wonder in the fact that, as each day passes, more people are becoming interested in the field of invention.

In our list of needed inventions this month we have noted a number of especially attractive problems that not only offer possibilities for fairly easy solution, but at the same time offer tremendous financial reward in event of final perfection. As an instance we have at least 500,000 mothers who would immediately buy an arrangement which would make it impossible for

(Continued on page 142)

Shown above are artist's impressions of the inventions suggested in this article. Any of them can be perfected in the small home workshop. Secure advice on protecting your idea by writing to the Patent Editor, 529 S. 7th St., Minneapolis, Minn. Enclose a stamped, self addressed envelope.

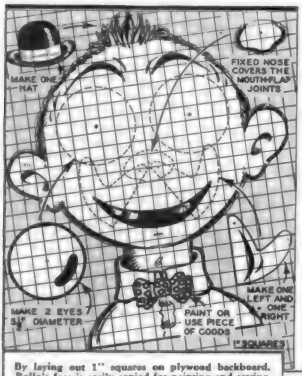
Build this COMIC FACE

by **PAUL W. GARTNER**

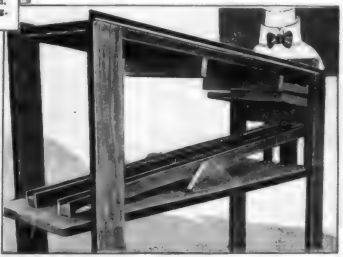
COMICAL ROLLO with rolling eyes, mustache-like mouth covering, and thimble hat will draw many an extra laugh from your holiday party guests. With this novel marble game there's no need to count scores or add up figures—Rolly politely doffs his hat, sadly rolls his eyes to console the loser—lights up his face with a broad grin of welcome for the successful player.

Before the player is a sloping board dotted with nails, pegs, and other marble hazards. At the end of the runway, standing 2 feet high from necktie to hat and exactly 20 inches between the ears is Rollo, the life of the party. At him the players roll their steel marbles, striving always to hit a victory hole in Rollo's chest.

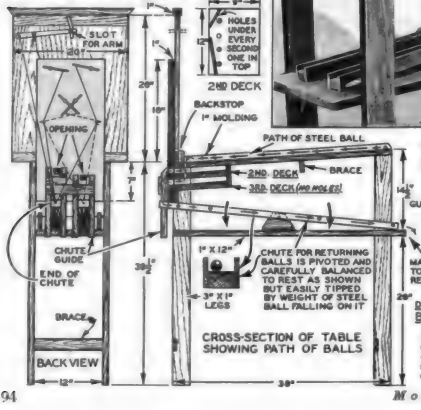
The dimensions of this game are logically up to the builder, but approximate sizes have been given as a guide. The arrangement of the nails and the pegs on the board can be patterned after those used on commercial marble games, or placed at random



By laying out 1" squares on plywood backboard, Rollo's face is easily copied for painting and sawing.

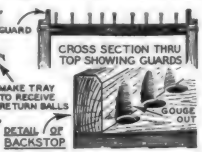


PLAN VIEW OF TOP OR BALL RUNWAY



CROSS-SECTION OF TABLE SHOWING PATH OF BALLS

Framework of marble game, showing return troughs mounted on fulcrums. Make tray to catch returned balls.

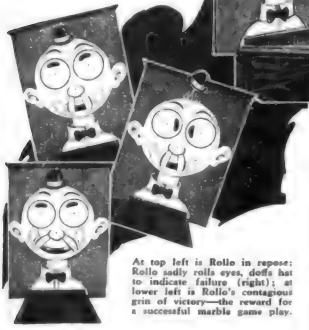


Back and side views of marble table show arrangement of ball-separating flecks, rigging of levers which animate Rollo's face. Gouge out back of table top so ball falls in one of holes.

MARBLE GAME

With rolling eyes and lifted hat, Rollo politely informs marble game players that they have missed. You'll like his broad and cheery smile of victory.

Push marbles or steel balls down table through maze of pegs and pins, then watch Rollo announce result of play.



At top left is Rollo in repose; Rollo sadly rolls eyes, doffs hat to indicate failure (right); at lower left is Rollo's contagious grin of victory—the reward for a successful marble game play.

to insure an erratic path for the steel balls.

Beneath the sloping ball runway are two boards set about one inch apart, parallel to the top. The board just below the top has four holes exactly under alternate holes above. A ball falling through one series of holes will stop at the second deck, while a ball going through the other holes will fall through to the third deck.

There are openings at the back of each deck, with a chute or trough below each to catch the balls and return them to the front. Each chute is fixed on a fulcrum, the added weight of the dropping steel ball causing them to lower slightly. As the back end of a trough drops, it pulls strings which move certain features of the comic face.

The eyes, mouth covers, hat, and nose are set out from the face proper by dowels. The eyes turn in their sockets, but the nose is fixed. The mouth covers move on dowels which come through the face underneath the nose. An up and down motion is given to the hat by a wood lever. Other levers operate eyes and mouth covers.

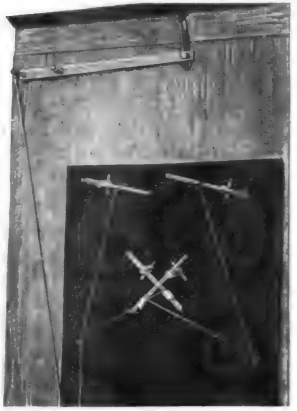
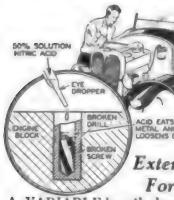


Photo of facial rigging, showing hat-lifting lever, counterbalanced eye and mouth levers. Sheet lead added to levers makes eyes, mouth return to normal position each time.

Counter weights of strip lead may be necessary on some of the levers to make the moving parts resume their normal positions again once the balls have rolled forward.

The face itself can be cut from plywood, and painted in gay colors according to the squared paper design.

HELPFUL AUTOMOTIVE KINKS

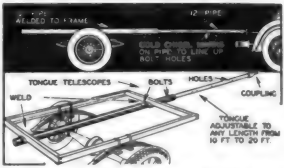


Nitric Acid Used to Loosen Broken Drill Heads

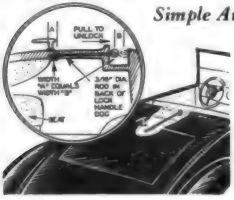
IF YOUR drill breaks off when boring into broken stud bolts in an engine block, this simple kink will loosen the drill enough to permit it to be pulled up, regardless of how tightly it is jammed. Fill the hole with a 50% (half acid—half water) solution of nitric acid. Blow out the acid after a minute or so and refill, until the drill can be fished out. Flush out excess acid with water.—R. F. Jennings.

Extension Draw-Bar For Auto Trailer

A VARIABLE length draw-bar will be found convenient for your auto trailer when carrying poles, lumber, or even boats. Two bolts passing through the telescoping pipes permit setting the tongue at any desired length from 10 to 20 feet. The larger pipe may be fastened to the frame with U-clamps.—J. E. Hogg.



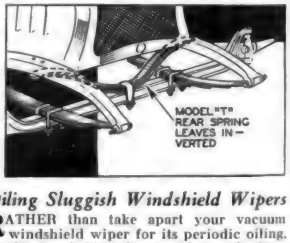
Simple Auto Rumble Seat Lock Operates Without Key

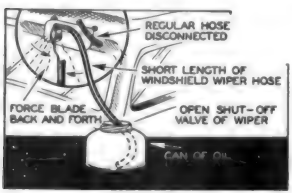


CONSIDERABLE trouble in opening the key type of rumble seat lock is often encountered, especially in winter when ice forms in the key hole. With this simple locking device, the rumble seat door can be instantly locked or unlocked by operating a lever from inside the car. Drill through the back of the seat for a 3/16" diameter steel rod. Use a rod long enough so that when pulled forward till it touches the seat back the other end will just clear the rumble seat door lock. When pushed back, this rod engages with the lock, effectively holding the door in position.—F. H. Gayette.

Adding Extra Spring to Your Car

WHEN front springs of a car sag, causing hard steering and bumpy riding, this easily installed auxiliary spring will cure the trouble. Remove the two largest leaves from the rear spring of a model T Ford, then take out the next three. Raise the car frame by jacking up the front bumper, then place these in the position shown in the drawing at right, and bolt on the U-clamp.—C. S. Sikou, Chicago, Ill.

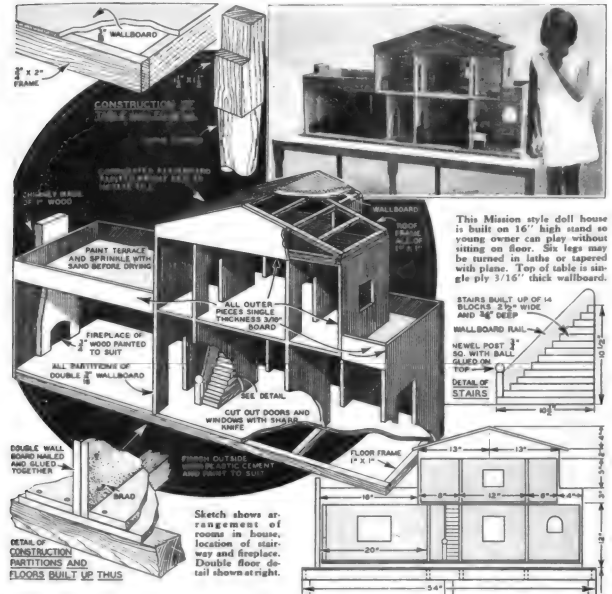




Oiling Sluggish Windshield Wipers

RATHER than take apart your vacuum windshield wiper for its periodic oiling, try this simple kink. Remove the regular hose from the wiper, and slip in its place a short length of tubing. Allow the end of this tube to dip into your can of oil, open the shut-off valve, then force the wiper blade back and forth a few times to suck in the oil. Every part of the wiper will be oiled by this method.—E. J. Novak, Omaha, Nebraska.

Build a Mission Style Doll House



This Mission style doll house is built on 16" high stand so young owner can play without sitting on floor. Six legs may be turned in lathe or tapered with plane. Top of table is single ply 3/16" thick wallboard.

Sketch shows arrangement of rooms in house, location of stairway and fireplace. Double floor detail shown at right.

PATTERNED after a California Mission style building, this attractive, roomy doll house is easily built at little cost. The completed house with cheery red roof and tinted walls makes a decidedly welcome present for any little girl. Miniature furniture pieces as well as quite a sizeable family of dolls can be placed in its many rooms.

Double thicknesses of wallboard for the partitions will prove amply strong enough without any reinforcing frame; so sturdy is this house that two children can sit on the roof without damaging the structure.

A stucco effect is achieved by first applying plastic cement to the outside walls with a brush, then tinting in cream or any other selected color.

Floor plans and front elevation are drawn to scale. Room interiors may be painted after the house is completely built.

Build Your Own Equipment for

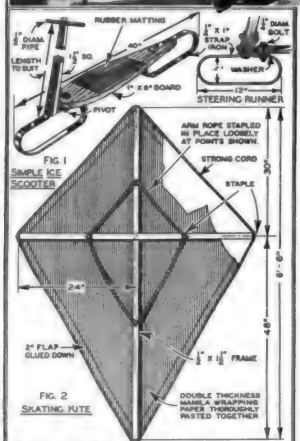
Here are plans for an ice glider, skating sail, willow skis and snow shoes, and a garage-roof toboggan slide.

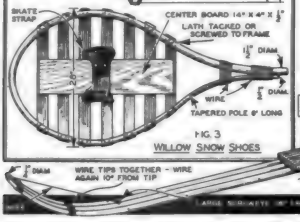
EVERY lake, river, and hillside, responding to the magic touch of King Winter, becomes a natural playground during the winter months. Cheeks tingle with a healthy glow as young and old alike race across the dazzling whiteness of ice and snow on sleds, skis, toboggans, skates or snowshoes. There's just as much fun in store for you with these home-made pieces as with the expensive factory-made equipment.

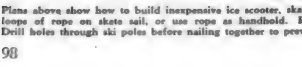
With a skating kite you can coast along before a stiff breeze, and even tack into the wind just as iceboats do. Make the frame from stout ½"x1½" pine boards, nailing them together securely at the center with 6-penny box nails. After stringing a strong cord around the frame and stapling it to each end piece, paste a double thickness of stout wrapping paper over the cord.

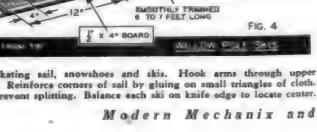
Ice gliders or scooters, quite the rage in Germany this season, are not hard to make. Strap iron or ¼" metal pipe is bent to shape for runners, and bolted to the frame and steering post. A cross-bar on the steering post provides a convenient hand-hold when racing across the ice.

Snowshoes are the thing for cross-country hikes when the snow is soft and deep. Cut and trim two 6 ft. long willow poles, then bend down the tips to form a loop frame. Wire the ends together and nail on lath cross-pieces. Tack the center board over the laths, then fasten a canvas skate



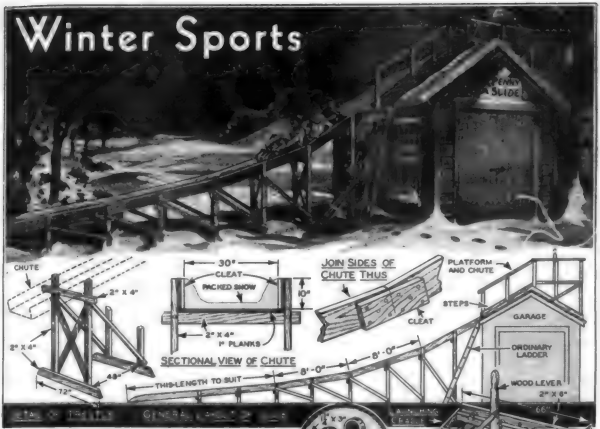






Plans above show how to build inexpensive ice scooter, skating sail, snowshoes and skis. Hook arms through upper loops of rope on skate sail, or use rope as handhold. Reinforce corners of sail by gluing on small triangles of cloth. Drill holes through ski poles before nailing together to prevent splitting. Balance each ski on knife edge to locate center.

Winter Sports



By charging penny a slide, materials for garage-roof toboggan slide pictured above can be paid for in few weeks. Small toboggans are easily carried up ladder to platform. Pack snow in chute to make deep groove, then sprinkle thoroughly with fine water spray every freezing night.

strap a little forward of the center of the board, to hold the toe of your shoe.

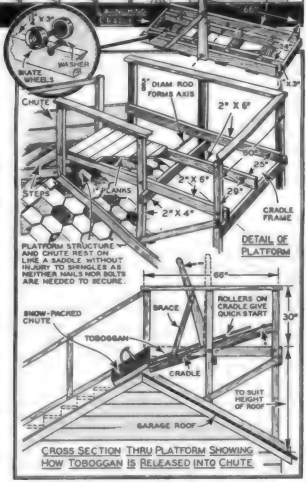
Six straight willow poles each about 7 ft. long can be made into an inexpensive but very speedy pair of skis. Fasten three poles together for each ski, with long finishing nails, then draw the tapering tips up with wire. Smooth down any rough spots on the ski bottoms with a plane. Nail foot boards at the centers of balance, attach toe straps, and your skis are ready for a try-out.

These pole skis are light, making them ideal for jumping or for skimming down steep hills. Use a long pole to aid you over rough spots and help keep your balance.

The roof of a garage or other small building will provide a speedy send-off platform for your toboggan slide this winter. With the launching cradle described here there will be no danger of the toboggan getting under way until all the riders are seated.

Build the slide on the side of your building which faces a vacant lot, to secure a long runway. Old 2"x4" lumber is used for the framework, and rough planks for the chute.

The launching cradle has eight pairs of skate rollers set in notches on the frame. The starter simply pushes over the long lever to tilt the front end down, giving the loaded toboggan a speedy send-off.



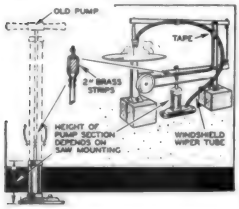
Suggested construction of toboggan slide is shown in above plans. Platform straddles roof, preventing damage to the roofing material. Build steps up roof alongside the slide, then place ladder against garage just below. Steps on roof may be continued all the way down if lumber is available.

Drill Holes in Square for Marking Gauge

FRACTIONAL dimensions on a steel try-square are more readily located if a small hole is drilled at the end of each graduation mark. A 3/32" hole will be found satisfactory; use a center punch to be sure the drill does not slip when starting to drill. The square can now be used as a handy marking gauge, accurate enough for all general carpentry work. Merely insert a pencil in the desired hole.—P. Nelson.

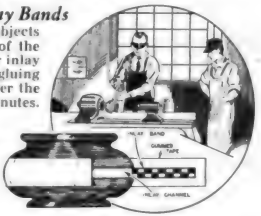
Tire Pump Makes Jig Saw Blower

WHEN doing fine fret-work on a jig saw, some type of blower is almost necessary to keep the sawdust off the pattern. Cut off the barrel of an old tire pump about three inches from the base, this height varying with the space under your lower saw arm. Anchor the pump base to the floor, and fasten the pump piston rod to the saw arm. Run windshield wiper tubing from the pump outlet to a point just above the saw blade.—T. M. Dobbins.



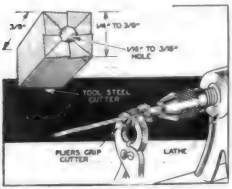
Setting Inlay Bands

IT IS often difficult to set inlay strips on circular objects such as vases or bowls, due to the breaking of the strip. This can be prevented by placing the veneer inlay strip on a piece of gummed paper tape before gluing into the channel. Moisten the gum, then press over the face of the veneer and allow to dry for a few minutes. Now feed the inlay strip into the glued channel. The tape will prevent cracking of the wood, and hold the inlay in position until dry.—O. E. Olson.



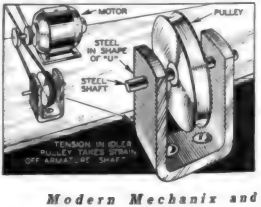
Make Dowel Cutters

DOWEL cutters are readily made from square tool steel stock by first drilling a hole the size of the desired rod through the tool, then filing out cutting teeth on one face. To use, grip a ¼" hardwood dowel in a lathe or drill chuck, rotate at high speed, and file one end to a point. Gripping the cutter with pliers, force it over the point and along the dowel the required length.—E. M. Love.

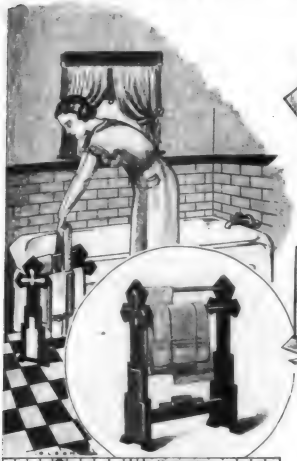


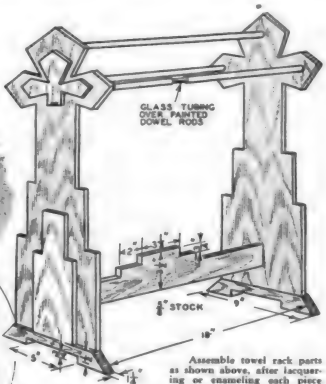
Idler Pulley Increases Life of Motor

OFTENTIMES the belt of a workshop electric motor will persist in slipping unless tightened to the point where armature shaft friction causes overheating. To overcome this, place another pulley on the motor shaft, and run a belt from this to an idler pulley mounted on the workbench, as shown in the accompanying drawing. This auxiliary belt should be adjusted to exactly neutralize the pull of the driving belt on the motor armature.—A. H. Waychoff.



Make a Modernistic Towel RACK





Assemble towel rack parts as shown above, after lacquering or enameling each piece in color scheme of bathroom.

by **O. E. OLSON**

WITH extra towel space always welcome in any bathroom, this novel towel rack in modernistic design makes a useful as well as interesting workshop project. The stand also serves as a small drying rack which may be moved readily to any room in the house.

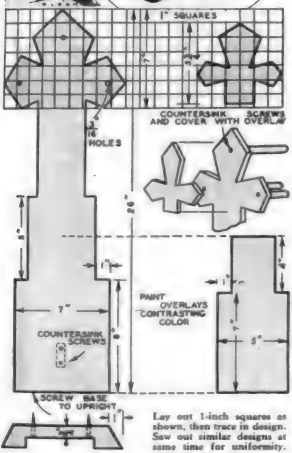
Either hard or soft woods may be used, the final finish and appearance desired being the determining factor. White pine serves very well, but should be lacquered or enameled in a color scheme which will harmonize with that of your bathroom.

Both uprights can be cut in one operation from ⅝" stock by tacking two boards together, then drawing the squared pattern on the top piece. Both sets of overlays are cut in the same manner, and all edges squared and smoothed with sandpaper.

Glass tubing over painted dowel rods will add greatly to the appearance of the cross poles.

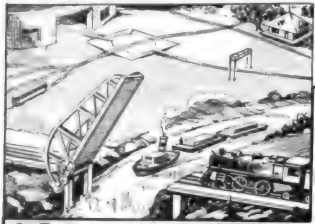
Where the overlays are painted in contrasting colors, all pieces should be painted before assembly. The overlays are then glued in place and drawn up tight by brads through the back.

Soft wood surfaces should be primed with one coat of shellac before applying two coats of good lacquer or enamel.

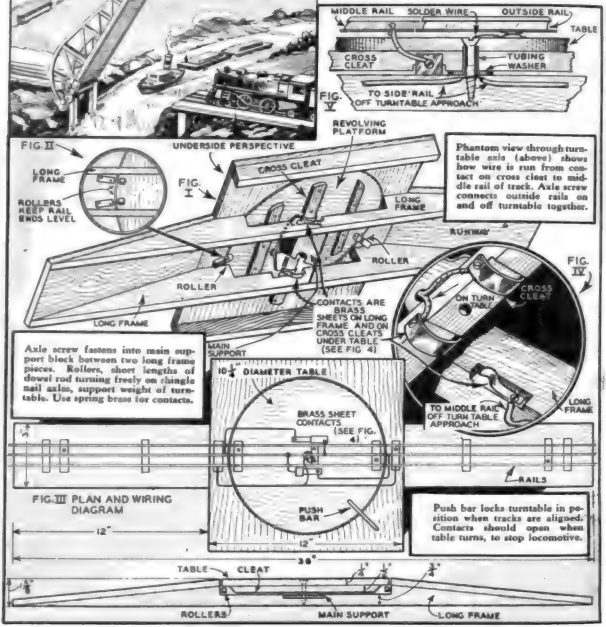


Lay out 1-inch squares as shown, then trace in design. Saw out similar designs at same time for uniformity.

A Turntable and Drawbridge



Your three-quarter inch gauge model railroad system is hardly complete without the semaphore, roundhouse and bridge equipment shown here.



A DRAWBRIDGE, crossing gates, roundhouse turntable, and semaphore signal for your 00 gauge electric train are easily made, and add much to the fascination of operating a miniature railroad system.

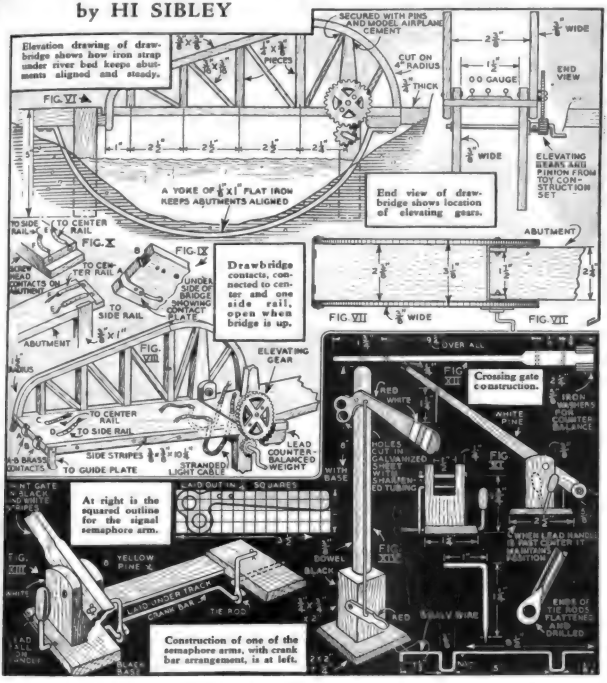
The locomotive turntable, as well as all other equipment, is built from packing box material or scrap white pine lumber. Both the turntable and the drawbridge cut off the current when they are open.

A 10¼" diameter turntable disc is accurately cut out from the center of the 12" square table with a coping saw, making as true a circle as possible. Disc and table are then mounted on the long frame pieces, and two tiny rollers set at opposite ends of the platform to keep the turntable flush.

The vertical axle of the turntable must be in its exact center. A short section of brass tubing, serving as a bushing, will prevent

for Your 00 Gauge Railroad

by HI SIBLEY



excessive wear at this point. The axle itself is a wood screw.

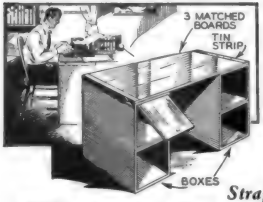
Counterbalance weights are used on the drawbridge, and trimmed to permit the structure to balance at any position. The two abutments are tied together with a flat iron bar beneath the stream bed if you have an outdoor installation, and by thin strips of wood if indoors. Build up the bridge and its approaches as shown in the sketches, cutting out curved members with a jig saw. Assemble the pieces with straight pins and model airplane cement. Before attempting to drive pins through thin wood, however, it is best to drill holes with a pin drill or a length of piano wire ground sharp at one end.

Note that the axis of the bridge is somewhat above the level of the rails. This allows the ends of the rails to clear when opening the bridge, and gives more clearance above the water or floor for the gearing.

Brass spur gears of any kind with about a 4 to 1 ratio will be satisfactory. A crank

(Continued on page 124)

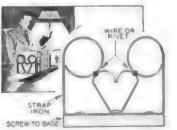
NOVELTY HOME FURNITURE



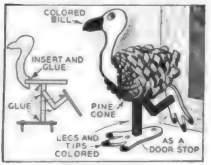
Knee Hole Desk From Packing Boxes

THIS modernistic knee hole desk makes a fine study table for your room, yet costs only the price of the paint. The necessary packing boxes are generally to be had at a grocery store. Three wide matched boards give a smooth surface to the top, but almost any other material available, such as metal or plate glass, can be used. Get four boxes of about the same size, around 26″x15″x12″ wide. Nail the boxes together as indicated, then neatly fit strips of tin to the top edges. Sandpaper and enamel carefully.—V. H. Everett.

Strap Metal Book Ends



A VERY attractive set of book ends can be made by using a combination of strap metal and wood, in various patterns similar to that shown. The wood for the base is drilled and loaded with metal to give stability. Either wire or solder may be used to fasten together the different parts of the strap metal design, and screws used for mounting on the base. Finish in attractive enamel or polychrome colors.—Raymond V. Nord.



Pine Cone Dodo Bird Makes Novel Door Stop

AMUSING and surprisingly life-like birds can be made from those large pine cones brought back on your vacation trip. First cut the head, neck, feet, and legs from plywood, sandpaper, and paint. Where the neck is to join the body, drill a hole and insert a wooden plug. Glue on the wedge-shaped foot and the extra leg. Remove a few scales from the cone if necessary, to insert and glue in place the neck and legs. The wedge-shaped foot, if made sufficiently large, jams under the door to act as an efficient stop. Give the cone a coat of clear varnish or lacquer.—Donald G. Anderson.

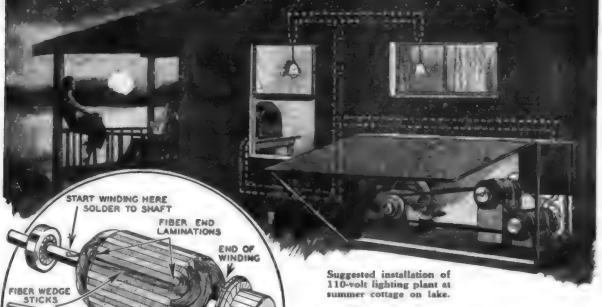
Tiny Cabin Makes Attractive Clock Mounting

TRANSFORM your old battered alarm clock into an attractive rustic cabin clock. Build the cabin of quarter-inch straight twigs, cutting a circular hole in one end the exact size of the clock face. Cut the backboard and floor from 1-inch material. The cabin is hinged to the backboard on one side, and secured with a small latch on the other. To wind or regulate, just unlatch the cabin. After logs have dried, stain them green or brown. If willow twigs are used, the bark should be peeled before drying; with pine twigs it can be left in place.—G. Van Horn.

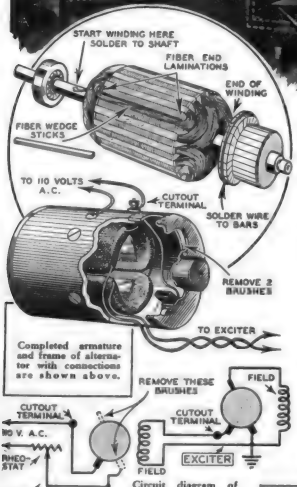
Frame Enlargements With Cellophane

PROTECT your best photo enlargements by mounting in inexpensive cellophane frames. After gluing the photo down on heavy cardboard, trim to allow 1″ at top and sides, 1½″ at bottom of the picture. Fold a sheet of cellophane over the face of the photo, cutting out the corners, and then rubber cement the flaps to the back. To obtain a surface as smooth and clear as glass, moisten the front of the cellophane with a damp piece of cotton and allow to dry. Cut a mask from photo mounting board and fasten over the cellophane with rubber cement to complete the frame. A cardboard stand glued to the back is recommended.—J. Berge.

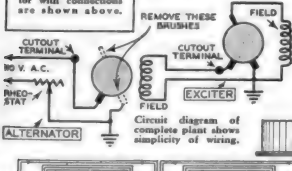
Build This 110-Volt Lighting Plant



Suggested installation of 110-volt lighting plant at summer cottage on lake.



Completed armature and frame of alternator with connections are shown above.



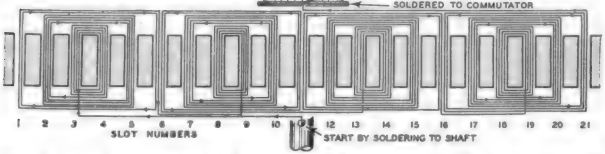
Circuit diagram of complete plant shows simplicity of wiring.

FOR the lake cottage, for the shop of the home experimenter, and for farm homes without electricity this 110-volt alternating current generator, made by rewinding the armature of a model T Ford generator, will be found invaluable. If properly built, it will deliver up to 200 watts at 110 volts continuously without overheating—enough to run your radio set and two 60-watt light bulbs.

A generator with burned-out armature coils may be used for the alternator, since new windings will be placed in the slots. Remove the gear pin, pull off the gear, and take the generator apart. Pry all windings from the commutator with a screwdriver, pound out the wedges in the slots, then remove the old windings. Clean all the old insulation out of the slots.

Now twist a heavy copper wire around the commutator risers (the highest parts) and flow solder evenly over it to connect

(Continued on page 124)



Direction of windings on above diagram must be followed exactly. Slots 1 and 21 have only 40 turns each, so fill in remaining space with wedges. All other slots will have approximately 80 turns in each. Cut 21 pieces of .007 insulating paper (red rope paper) 2½"x1¼", to place in slots before laying in wires. Do not damage the insulation.

Mount Old-Fashioned Pendulum Clock in a Frying Pan

Front and back views show how pendulum clock movement is set in frying pan for wall mounting. Left: Suggested method of mounting clock on frying pan to allow sufficient clearance for gears. Four 2½ inch bolts will be needed for movements of this type.

WHERE the case of an old pendulum clock is damaged beyond repair, yet everything else in good working order, the movement may be mounted in an ordinary frying pan. Finished in gold bronze and black enamel, an attractive novelty as well as an accurate timepiece is had for the wall of either the hall or den.

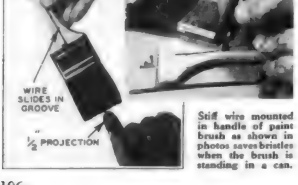
Clean and oil the movement, using jeweler's oil, then mount in an 8" diameter, 2¾" deep frying pan. In most cases it will be necessary to shorten the striking hammer and coil the gong into a smaller space, to fit in the pan. Cut a hole for the pendulum, another for the hands.

Polish the entire pan with steel wool, then letter in the face, using drafting pens and black enamel.

Stiff Wire Saves Paint Brush Bristles

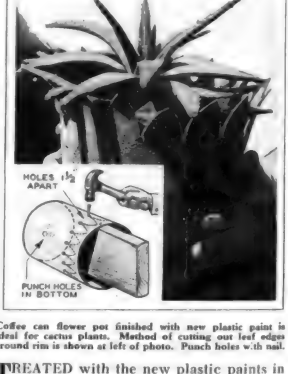
A PAINT brush which supports itself while standing in a can of paint will last much longer, eliminating the annoyance of picking broken bristles from the work. The sliding support described here can be instantly pushed through the bristles when needed.

Drill through the paint brush handle a hole just large enough to make a snug fit for a length of stiff wire. Cut out the upper end of the hole to form a groove, then bend the end of the wire to form a loop. The other end of the wire is cut so that it will project ½" beyond the bristles when the loop is down.



Stiff wire mounted in handle of paint brush as shown in photos saves bristles when the brush is standing in a can.

Coffee Cans Serve as Flower Pots



Coffee can flower pot finished with new plastic paint is ideal for cactus plants. Method of cutting out leaf edges around rim is shown at left of photo. Punch holes with nail.

TREATED with the new plastic paints in a soft brown or tan color, two or five pound size coffee cans make really attractive and novel flower pots.

Cut serrated decorations around the top by first punching holes about 1½" apart along the top edge with a nail, then cutting out the leaflets with tin snips. A few nail holes should also be punched into the bottom for drainage.

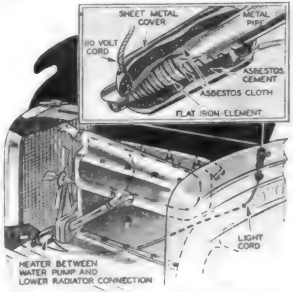
This coffee can flower pot should be set in a plate to catch excess water. It will be found especially attractive for potted cactus plants.

Cold-Weather TIPS *for* MOTORISTS

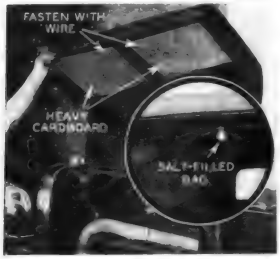
STARTING a car in below-zero weather is often a serious problem for the motorist whose garage is not heated. This simple heating unit, operating from a 110-volt A. C. power line, will bring your motor up to easy-starting temperature in less than half an hour. At the same time it warms the oil, insuring immediate circulation once the motor starts.

The heater surrounds the metal pipe connecting the water pump to the lower part of the radiator. If this is an all-rubber connection on your car, cut out a length of hose, then insert a piece of metal pipe of the proper diameter.

To make this heater, remove the pipe from the car, and wrap around it a layer of asbestos cloth or mica. Carefully remove the ribbon resistance wire from an electric iron element, and rewind around the asbestos. Now wrap on two more layers of asbestos cloth.



Phantom view shows construction of cooling system heater, while installation is covered below. Run extension cord along steering post to dash, then attach bayonet plug.



Fasten pieces of cardboard inside hood cover openings as shown to maintain proper engine temperature, improve operation of car heater. In circle: Method of softening sleet to prevent annoying ice formation on the windshield.

Fasten the ends of the heating element to an extension cord, using silver solder or small bolts passing through the outer layers of asbestos. A one-inch layer of asbestos cement completes the heater. Before the cement dries, push the entire assembly into a sheet metal cylinder of the proper size, bringing the drop cord out from one side.

Salt Keeps Sleet Off Windshield

A few ounces of ordinary table salt carried in a small bag above the windshield wiper of your car will prevent ice from forming over the glass in sleet storms. The salt, mixing with the snow or ice, retards freezing of the snow or ice long enough for the wiper to brush it off.

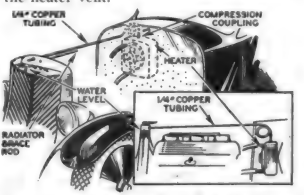
Normal auto engine temperature can be maintained more easily in cold weather if squares of cardboard are wired in place on the inside of the hood to partly cover the louvre openings.

With the engine running warmer, the efficiency of both the hot water and manifold type car heaters will be improved, and winter driving made more comfortable.

An old razor blade or two slipped under the floor mat will be found useful in removing ice that forms over car windows after a drive through sleet.

Tube Removes Heater Air Pockets

Air pockets in the hot water heater of your car will cut down its heating efficiency considerably. By running a copper tube from the vent plug outlet at the top of the heater to the highest point in the tank of your radiator, these air spaces can be automatically cleared. Solder a compression coupling into the radiator tank, to take this tubing, and attach a standard ¼" fitting to the heater vent.



Copper tube run from heater to top of radiator as shown automatically clears air pockets forming in heating system.

New CARD TRICKS with

In the days when the famous side-wheeler "Robert E. Lee" plied the muddy Mississippi, card tricksters often used the Mark Twain "stack." They could locate any card in a pack which had been cut repeatedly by spectators, yet even close scrutiny would fail to reveal any tampering with the deck. Revealed here is the secret.

MEMORIZE CARD ORDER before attempting tricks shown here for the Mark Twain "stack." Deck of cards laid out in circle shown correct sequence. First memorize suit order: Hearts, clubs, diamonds, spades, etc., then numerical sequence: 1, 5, 9, K, 4, 8, Q, 2, 6, etc. Face cards are given numerical values: Jack 11, Queen 12, and King 13, in stacking deck.

FIG. 1 — DECK IS CUT INTO FIVE STACKS. TOP CARD IS CLUE TO UNSEEN BOTTOM CARD OF NEXT STACK AS SHOWN BY ARROWS.

the Mark Twain "STACK"

If bottom card is noted while placing Mark Twain "stack" in box, as shown in photo inside circle, position of any other card can be readily computed after a few hours of practice. All cards in this sequence have a fixed numerical relation to each other as told in article.

FIG. 2—PLAY AMERICAN NAME TOTAL OF FIRST FOUR CARDS OF ANY STACK WITH ONLY TOP CARD FACE UP

by DICK COLE

WITH the passing of the river side-wheelers, the traveling card tricksters, and the old front parlor, really good card tricks seem to have become also a memory of the past.

Perhaps you have heard old-timers tell of men who could name the location of any card in a pack that had been cut repeatedly by spectators, then placed in its case and sealed. There was no magic, no sleight of hand trickery used in performing this trick—it was done by arranging the cards beforehand in a certain order which was then known as the Mark Twain "stack."

Cards Appear Mixed Up in Stack

At first glance there appears to be no regular order to the cards in this stacked pack, shown in the circle at the left; a little study, however, will show you the simple mathematical relations existing between every card in the sequence.

After becoming familiar with the Mark Twain "stack," the novice can perform tricks which truly mystify the spectators. Introduce the stacked deck as unobtrusively as possible.

The pack can be cut and re-cut any number of times, but it must not be shuffled. Chances of detection will be even less if a few false shuffles can be made as the cards are brought out.

Here is the first trick. After the pack has been cut a number of times, an onlooker is asked to cut the pack into five piles by taking groups of them from the top of the deck. Each top card is turned over, whereupon the trick master immediately names the bottom card of each pile.

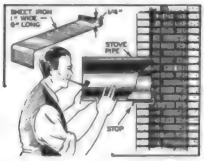
Solution of "Five Pile" Trick

The solution of this trick will be obvious to the person who has learned the Mark Twain "stack." In Fig. 1 the pack, face down, is cut into five piles, with pile A taken off the pack first, then B, C, and D in order, leaving the remainder of the pack to serve as pile E. To more clearly illustrate the trick, the bottom and top cards of each pile have been turned up.

To obtain the bottom card of a pile, note the top card of the following pile (in the stacked deck this card is next to the card whose value you are computing), then subtract four from the numerical value and reverse the suit order one step. Thus, with the six of spades seen as the top card of pile B, four is subtracted and the suit order coming before spades selected to give the *two of diamonds.*

(Continued on page 122)

HOME REPAIR SUGGESTIONS

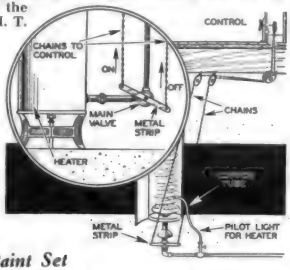


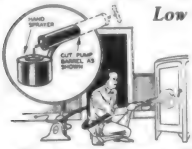
Iron Strap Aligns Pipe With Chimney Flue

WHEN a stove will not operate properly, the trouble may sometimes be found at the point where the stove pipe enters the chimney flue. The pipe may be pushed in so far that it cuts off the draft. To avoid this, bend the ends of a piece of strap iron as shown in the accompanying drawing, then place in the chimney flue hole before setting in the stove pipe.—H. T. Collins.

Remote Control for Water Heater

THE hot water heater may be started or stopped from upstairs in exactly the same manner as the drafts of many furnaces are controlled by chains running through pulleys. A metal arm about six inches long is fastened to the gas valve, and one chain attached to each end of the strip. Run these chains through pulleys and up through the floor to convenient control point, where they attach to a standard furnace control. Pilot burner must run continuously.—Edw. Evers.



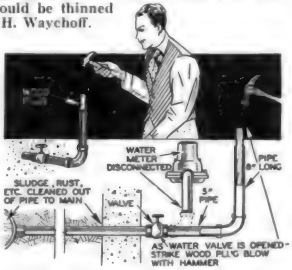


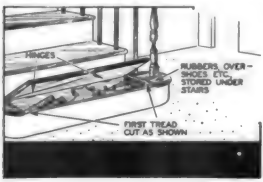
Low Cost Spray Paint Set

WITH this inexpensive but efficient spray painting outfit autos can be painted, furniture lacquered, and enameling of small objects easily done. Cut off part of the pump barrel of one of the small hand sprayers used for fly sprays, then slip over the remaining part a length of vacuum cleaner hose. Attach the other end to the sweeper. Ordinary paints should be thinned somewhat.—A. H. Waychoff.

Cleaning Clogged Water Pipes

INSTEAD of tearing up the lawn and street when city main water pipes become clogged with rust and scale, try this water hammer stunt. Shut off the water, then disconnect the meter from the street main and put in its place the elbow pipe shown at right. Place a snug-fitting wood plunger in the pipe, hold it down, then turn on the water. As the plunger floats up, drive it back sharply with a hammer. Repeat several times, then flush out the loosened scale.—E. J. Novak.



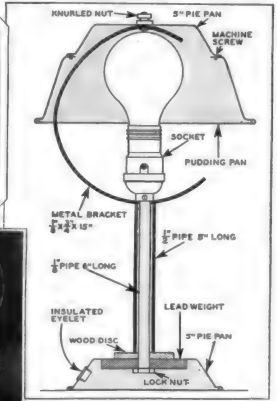


Stair Step Makes Shoe Storage Box

THE waste space under the first one or two steps of a flight of stairs can be put to use as a storage place for shoes, rubbers, or overshoes at very little expense. Cut the treads at the ends, then hinge each at the back. Place the hinges carefully on the sides of the boards rather than on top of the tread.—D. L. L., Caldwell, W. Va.

Pie-Pan READING LAMP *is Adjustable*

Adjustable shade desk lamp made from kitchen pans, pipe fittings, is shown in use above. At right: Large hole is cut from pan used for lower part of shade, and two parts then bolted or soldered together. Use aluminum or strap iron for shade bracket. Metal bracket, wood disc above base, and upright pipe may be enameled black as contrast to gleaming aluminum or tin pans. Lacquer shiny parts to prevent tarnishing.



Cross-section of reading lamp shows assembly of different parts, mounting of shade holder.

GLEAMING aluminum or tin pie-plates form the base and shade of this novel desk lamp. A knurled nut adjustment on the shade holder permits setting of the shade at any desired angle.

A 5" pie-pan and a 7" pudding pan are cut and bolted together as in the sketches to make the shade. The shade is supported by a curved bracket, in one end of which is cut a 3/16"x1½" adjustment slot.

Discs of sheet lead are bolted inside the base pan to give sufficient weight to the lamp.

A nickel-plated socket, harmonizing with bright metal shade, fastens to a ⅛" pipe nipple 6" long fitting inside the ½" upright pipe.

Rope on Pipe Prevents Sweating

Wrap single layer of rope or old light cord around cold water pipes to prevent sweating and constant drip of water.

WHERE the moisture condensing on cold water pipes and dropping off continually proves annoying, a single layer of rope or cord wrapped around the pipe will prove a good remedy.

Hang Folding Cupboard Anywhere

OILCLOTH-covered shelf boards fastened together with canvas make a practical cupboard which folds into a compact bundle. For the auto tourist and the housewife who occasionally has need for extra shelf space this collapsible cabinet will be found ideal.

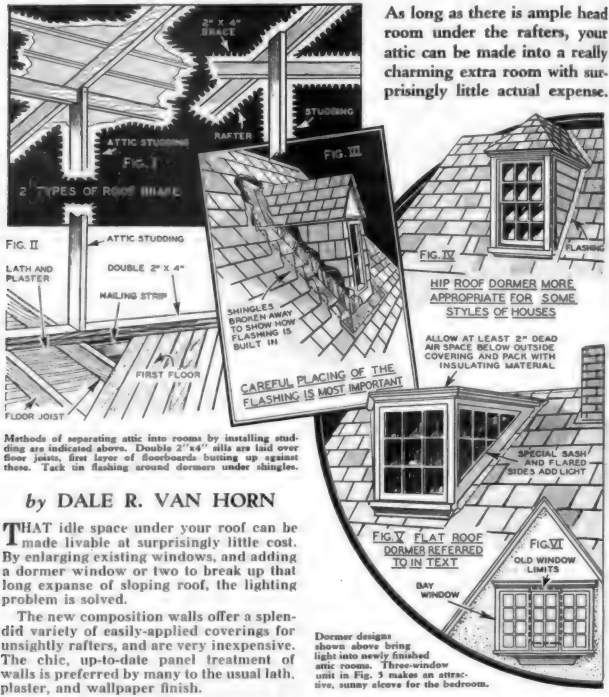
Canvas or netting can be made to drop over the front, protecting articles on the shelves from dust and insects.

A leaky water pail placed on the top shelf will keep the canvas moist, cooling perishable foods inside. Evaporation of water from the canvas lowers the temperature of the air inside the closed compartments.

Completed hanging cupboard is shown open at left, folded above. Attach strong ropes to top corners, run to metal ring, then up to tree or other convenient support. Tack canvas to ends of shelf boards on sides, back.

Utilizing That IDLE SPACE

As long as there is ample head room under the rafters, your attic can be made into a really charming extra room with surprisingly little actual expense.



Methods of separating attic into rooms by installing studding are indicated above. Double 2"x4" sills are laid over floor joists, first layer of floorboards butting up against these. Tack tin flashing around dormers under shingles.

Dormer designs shown above bring light into newly finished attic rooms. Three-window unit in Fig. 5 makes an attractive, sunny alcove for the bedroom.

by DALE R. VAN HORN

THAT idle space under your roof can be made livable at surprisingly little cost. By enlarging existing windows, and adding a dormer window or two to break up that long expanse of sloping roof, the lighting problem is solved.

The new composition walls offer a splendid variety of easily-applied coverings for unsightly rafters, and are very inexpensive. The chic, up-to-date panel treatment of walls is preferred by many to the usual lath, plaster, and wallpaper finish.

Remodeling plans should be worked up in detail before any changes are attempted, to insure that your individual ideas, when combined in the completed project, will harmonize. Your local carpenter and lumber dealer will gladly help you plan the changes for your own attic.

Under the National Housing Act you can obtain loans of from $100 to $2000 from banks, building and loan associations, or finance companies to cover the cost of the project.

Once having determined upon the plans to use and the wall treatment to be employed, the first step of actual alteration calls for the window installations. Proper roof bracing and the laying of the floors follow. To obtain the best results, shiplap should be laid diagonally across the joists as shown in Fig. 2. A hardwood floor, preferably of boards less than 3 inches wide, is laid upon this in the usual way.

Studding should also be conventional, the tops being set in one of the two methods

Under Your Roof

One would not suspect this charming, cozily finished retreat to once have been idle attic space. Inset shows proportion of attic space which can be utilized for rooms.

New composition paneling for ceiling, walls, is easily tacked up in large squares. Use insulating blanket between rafters.

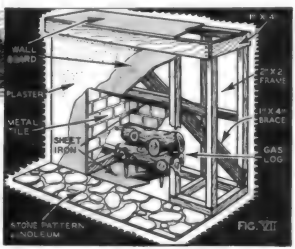
Besides the usual overhead outlets for lights, it would be well to add an adequate supply of wall and floor outlets for future use.

Regardless of the type of dormer you build, careful placing of the flashing is highly important. (See Fig. 3.) While a

(Continued on page 130)

shown in Fig. 1. It is highly recommended, too, that a double sill of 2x4's be laid underneath the studding.

At this stage of the project your local electrical contractor should be called in, to install necessary lighting. Though wiring may seem a trivial matter, it must be done exactly according to the specifications set forth by fire underwriters, to avoid trouble when collecting insurance for fire losses.



Where weight of stone fireplace makes it impractical for attic room, build this artificial mantel, installing gas or electric logs as shown to supply cheery light and heat.

Hobbyist Offers MM Readers Billion-Mark Bank Notes

Front and back views of 1923 German clay money. These and other pottery coins were in use just after the World war.

HENRY SCHLOEN has too much money—so much so that, after papering his bedroom with $4,500,000,000,000 in post-war German bank notes, he offers to send some to MM readers.

One of the high value German bank notes, together with an interesting specimen of Notgeld (Emergency) money will be sent free to each MM reader sending a self-addressed, stamped envelope to Mr. Henry Schloen, 265 Westervelt Ave., Staten Island, New York.

The money was issued during Germany's inflation period after the war. The inflated currency eventually was repudiated and is valueless today. Included in Mr. Schloen's collection are specimens of clay, pottery and cloth money.

U. S.—Tiny Imperforate Sheets

SOUVENIR sheets of six stamps, with appropriate inscriptions around the border, are made up from time to time in imperforate form by U. S. postal officials.

Collectors can still obtain sheets of six of the 3c Little America, 1c National Parks, and 3c National Parks, together with imperforate sheets of 25 of the Century of Progress stamps.

A list of the current and old stamp issues available at face value plus postage will be sent those requesting it by the U. S. Philatelic Agency, Washington, D. C.

Italy—Mussolini Trains for War

IN LINE with Il Duce's command that military training of Italian youths be compulsory at the age of 8, a beautifully executed set of stamps picturing Italy's war forces in action has recently been issued.

Coming in two groups, the stamps for regular postage show the artillery, infantry, cavalry, signal corps, and hospital service

(Continued on page 116)

Beautifully designed set of stamps recently issued by Italy vividly portray Mussolini's thorough training of troops. Various branches of Italian army are shown in action on different stamps of regular postage set. Part of stamp money goes to charity.

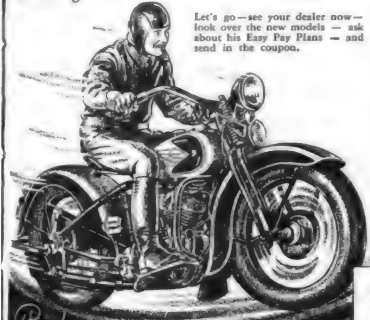
Like a Rocket Trip to Mars!

THAT'S THE *Thrill of the* 1935 HARLEY-DAVIDSON

Give it wings and it could almost take you to Mars like a rocket — the new '35 Harley-Davidson.

Boy, oh boy! You should know the tingle that creeps through you when you "take off" astride this plane-on-wheels. It begins when you kick the starter pedal. It grows stronger when you tip in the clutch and twist the throttle — it becomes a glorious thrill when you are zooming along out in front, never to be headed.

Get ready for "spring fever" time with a new Harley-Davidson. There are a dozen new improvements that make this the greatest mount in motorcycle history, and five striking color options to match its streamlined design.



Let's go—see your dealer now—look over the new models — ask about his Easy Pay Plans — and send in the coupon.

Ride a HARLEY-DAVIDSON

MAIL THIS COUPON

Harley-Davidson Motor Co., Dept. MM, Milwaukee, Wis.

Interested in Motorcycling. Send Illustrated literature. Postage Stamp is enclosed to cover cost of mailing.

Name_____

Address_____

My age is ( ) 16-19 years, ( ) 20-30 years, ( ) 31 years and up, ( ) under 16 years. Check your age group.

U. S. Navy Mail Clerks Use Colorful Cachet Designs on Holiday Mail

This interesting Columbus Day cachet, shown half-size here, was printed in maroon on all letters mailed from U. S. S. Northampton, October 12th.

HOLIDAYS are busy days for mail clerks on many United States Navy vessels. Collectors send stamped, addressed envelopes to these clerks months ahead of time, requesting that one or more be mailed back to them each time a special postmark or cachet is used.

Labor Day, Navy Day, and Columbus Day last year brought forth unusually artistic colored cachets, beautifully printed by a raised ink process, from the U.S.S. Northampton, 10,000-ton navy cruiser.

Italy—Mussolini Trains for War

(Continued from page 114)

in land maneuvers, while the airmail stamps picture zeppelin and airplane in aerial combat, as well as gunboats on the ocean.

Watch foreign letters for these stamps—they will make an interesting addition to your collection. Stamp dealers are now selling the set in mint condition for less than two dollars.

ADLETS FOR HOBBYISTS

STAMPS

ZANZIBAR—Also Sudan—Somaliland—Tigerstamps—Togoland—Caribbean Archer—Algerian—Centralamericans—Britishcolonials—This magnificencious collection free for 5c postage. Graystampshop, Dept. MM, Toronto, Canada.

HIGHEST Cash prices paid for your stamps. Royale Stampco, South Pasadena, Calif.

CLOSING out high-grade approval sheets. $1.10 net value 75c. Wonderful buys—no junk—satisfaction guaranteed. Yakima Stampco, Yakima 3, Washington.

FREE 250 mixed stamps to approval applicants only. Send 6c postage. Yakima Stampco, Yakima 3, Washington.

SUPER-WONDER Packet offered, containing 60 different stamps from Yemen, North Borneo, Sarawak, Zanzibar, Eritrea, Macao, Iraq, Jaipur, French, British, Portuguese Colonies, including warriors, natives, beasts, vessels, etc., all for 5c to approval applicants. Big lists included. Kent Stamp Company, Box 87Z, Brooklyn, New York.

STAMPS! 100 diff. 3c; 500 diff. 35c; 1,000 diff. 90c! Illustrated Album (4000 spaces) 22c. Approvals sent. Tatham Stamp Co. (D9) Springfield, Mass.

SCARCE Iceland Airmail Triangle and fine packet of 65 different stamps including Senegal, Jamaica, Guinea, South Africa, Oceanica, Nigeria, savages, maps, and animal stamps. Only 5c to approval applicants. Potomac Stamp Co., Dept. 902, Washington, D. C.

HEADQUARTERS—Stamp Collectors! Lowprice Sets. Penny Approvals. Request selection. Elyria Stamp Company, 437MI, Elyria, Ohio.

1000 U. S.—Good Mixture—contains airmails, specials, precancels, commems, dues, etc., price 50c. J. S. Edwards, 719 N. Lime, Lancaster, Pa.

SENSATION: Airmails from 10 countries; U. S., South America; Pictorials 10c. A. Steele, Springdale, Pa.

STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

IF YOU are a serious collector of the better grade of stamps my approvals will interest you. Send 25c for my introductory selection, and receive stamps cataloging over $1.50. References must accompany approval requests. Address F. Stein, Dept. 212, 7360 N. Seeley Ave., Chicago.

105 DIFFERENT, Hyderabad, Congo, Guinea, etc., 3c to approval applicants. Extras—Airmail Set Free with above. Hunziker, Box 225, Minneapolis, Minn.

30 DIFFERENT U. S., 30 Different Foreign and List of prices we pay for all Indianhead and certain Lincoln pennies. All sent for 10c. R. Smith, 914 Watson St., Flint, Michigan.

FREE!!! Russia Ethnographic set or three Spain Airmails. Postage 3c. Roberts, 901T Fourth, Baycity, Mich.

FREE Gorgeous packet, including Spanish airpost set, triangle, ships, maps; only 3c postage to approval applicants. Imperial Stampco, Fontana, Calif.

A STAMPEDE of Completion! 5 complete sets of Imperial & Soviet Russia, 1916, 1917, 1918, 1919, 1921 issues, all for 10c! Pearson Bros., 68 Nassau St., Dept. 501, New York.

TRADE your Duplicates! New way. Write for FREE information. World Wide Packet Exchange, Box 745-M, Beverly Hills, California.

COINS

$2000.00 FOR 1c. We pay the World's Highest Prices for old coins, encased postage stamps and paper money. Large Cents up to $2000.00 each, half cents $250.00, 1909 cent $10.00. Indian head cents $50.00, half dimes $150.00, 25c before 1873 $300.00, 50c before 1879 $750.00, silver dollars before 1874 $2500.00, gold dollars $1000.00, trade dollars $250.00, 1822 $5 gold $5000.00, old paper money $26.00, encased postage stamps $12.00, certain foreign coins $150.00, etc. Send dime for large illustrated list. Romanocoinshop, Dept. 420, Springfield, Mass.

HIGHEST Prices paid for Indian Head Pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-MM, Ottawa, Ill.

$5 to $500 EACH paid for Old Coins. Keep all old money. Get posted at once. Send 10 cents for Illustrated Coin Value Book 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 17, Le Roy, N. Y.

12 DIFFERENT Coins 25c, California Gold Quarter and Half 50c. Chester Brooks, 624 Cameron, Dallas, Texas.

FREE—Foreign coin, banknote, and large illustrated coin catalogue—4c postage. Souvenir California gold quarter size 26c; 3½ size 53c; both 65c! Round or octagon, set of each $1.30! Approvals with each order. Tatham Coinco, Springfield—9, Mass.

WANTED—Old Money, Stamps. List 20c. V. Kellermann, Box 483, Sturgis, So. Dak.

I BUY Indian head pennies and other coins. Send dime (coin) for valuable coin folder. Walls, 318 West 71 Street, Los Angeles, Cal.

OLD MONEY Wanted. $5.00 to $2,500.00 each paid for old coins. Buying catalog 10c. Robert Cohen, Box 483, Muskogee, Okla.

CALIFORNIA gold, quarter size 27c; 3½ size 53c; 100 different stamps and catalogue coins & stamps 10c. Norman Shultz, Salt Lake, Utah.

WE BUY Lincoln Head Pennies. Will pay up to $2.00 each if over ten years old. Indian Head pennies worth up to $51.00 each. Send 10c for Buying Catalog. Continental Coin Co., Incorporated, FD-111 West Jackson, Chicago.

FINE old Spanish silver "Pieces-of-Eight," also latest book on buried treasure by Harold Wilkins, World foremost authority. 128 Nelson St., Kingston, Canada.

WE Purchase All Indianhead Pennies. Pricerange 5c-$55.00. Purchasing catalogues 10c. Photonumismatic, 100 Forsyth, New York.

A Money-Making Opportunity

for Men of Character

EXCLUSIVE FRANCHISE FOR AN INVENTION EXPECTED TO REPLACE A MULTI-MILLION-DOLLAR INDUSTRY

Costly Work Formerly "Sent Out" by Business Men Now Done by Themselves at a Fraction of the Expense

This is a call for men everywhere to handle exclusive agency for one of the most unique business inventions of the day.

Forty years ago the horse and buggy business was supreme—today almost extinct. Twenty years ago the phonograph industry ran into many millions—today practically a relic. Only a comparatively few farsighted men saw the fortunes ahead in the automobile and the radio. Yet irresistible waves of public buying swept these men to fortune, and sent the buggy and the phonograph into the discard. So are great successes made by men able to detect the shift in public favor from one industry to another.

Now another change is taking place. An old established industry—an integral and important part of the nation's structure—in which millions of dollars change hands every year—is in thousands of cases being replaced by a *truly* astonishing, simple invention which does the work better—more reliably—AND AT A COST OFTEN AS LOW AS 1% OF WHAT IS ORDINARILY PAID! It has not required very long for men who have taken over the rights to this valuable invention to do a remarkable business, and those earnings which in these times are almost unheard of for the average man.

Not a "Gadget"— Not a "Knick-Knack"—

but a valuable, proved device which has been sold successfully by business services as well as seasoned salesmen.

Make no mistake—this is no novelty—no flimsy creation which the inventor hopes to put on the market. You probably have seen nothing like it yet—perhaps never learned of the existence of such a device—yet it has already been used by corporations of outstanding prominence—by chains of great corporations—by their branches—by doctors, newspapers, publishers—schools—hospitals, etc., etc., and by thousands of small business men. You don't have to convince a man that he should use an electric bulb to light his office instead of a gas lamp. Nor do you have to tell the same business man the idea that some day he may need running like this invention. The need is already there—the money is usually lying idle right at that very moment—and the dependability of saving the greatest part of that expense is obvious immediately.

Some of the Savings You Can Show

You will turn an office and put down before your prospect a basic from a sales organization showing that they did work in their own office for $11 which formerly could have run them over $200. A building supply corporation pays for one $70, whereas the bill could have been for $1,600! An automobile dealer pays our representative $15, whereas the expense could have been over $1,000. A department store has expense of $98.60, possible cost if done outside by business being well over $2,000. And so on. We could be possibly list all cases here. These are but a few of the many actual cases which we place in your hands to get with. Practically every line of business and every type of the country is represented by these field reports which, in manner across dazzling, convincing money-saving opportunities which hardly any business man can find to withstand.

Profits Typical of the Young, Growing Industry

Going into this business is not like selling something offered in every grocery, drug or department store. For instance; when you take a $7.50 order as much as $5.63 may be your share. On $1,500 worth of business, your share may be $1,167.00. The very least you get as your part of every dollar's worth of business you do is 67 cents —on ten dollar's worth $6.70, on a hundred dollars' worth $67.00—in other words two thirds of every order you get is yours. Not only on the first order—but on repeat orders —and you have the opportunity of earning an even larger percentage.

This Business Has Nothing to Do With House to House Canvassing

Nor do you have to know anything about high-pressure selling. "Selling" is unnecessary in the ordinary sense of the word. Instead of hammering away at the customer and trying to "force" a sale, you make a dignified, business-like call, leave the installation—whenever size the customer says he will accept—at our risk, let the customer sell himself after the device is in and working. This does away with the need for pressure on the customer—it eliminates the handicap of trying to get the money before the customer has really convinced himself 100%. You simply tell what you offer, showing proof of success in that customer's particular line of business. Then leave the invention without a dollar down. It starts working at once. In a few short days, the installation has actually produced enough cash money to pay for the deal, with profits above the investment coming in at the same time. Then the cash back, collect more money. Nothing is so convincing as our offer to let results speak for themselves without risk to the customer! While others fail to get even a hearing, our men are making sales running into the hundreds. They have received the attention of the largest firms in the country, and sold to the smallest businesses by the thousands.

No Money Need Be Risked

In trying this business out. You can measure the possibilities and not be out a dollar. *If you are looking for a business that is not overcrowded*—a business that is just coming into its own—a business that is not affected by a downgrade—a business that offers the buyer relief from a burdensome, but unavoidable expense—a business that has a prospect practically in every office, store, or factory unto which you can set foot—regardless of size—*that is a business* but does not have *any* prize cutting to contend with in other necessities do—that because you control the sales in exclusive territory in your own business—*that pays more on some individual sales than many men make in a week and gives promise as a month's income*—if such a business looks as if it is worth investigating, *get in touch with us at once* for the rights in your territory—don't delay—because the chances are that if you do wait, someone else will have written to us in the meantime—and if it turns out that you were the better man—we'd both be sorry. So for convenience, *use the coupon below*—but send it right away—or write if you wish. But do it now. *Address*

F. E. ARMSTRONG, President
Dept. 4019-B, Mobile, Ala.

EARNINGS

One man in California earned over $1,600 per month for three months—close to $5,000 in 90 days' time. Another writes from Delaware—"Since I have been operating (just a little less than a month of actual selling) and not the full day at that, because I have been getting organized and had to spend at least half the day in the office; counting what I have sold outright and on trial, I have made just a little in excess of one thousand dollars profit for one month." A Georgia man made $802.50 his first two weeks. A Connecticut man writes he has made $55.00 in a single day's time. Texas man nets over $300 in less than a week's time. Space does not permit mentioning here more than these few random cases. However, they are sufficient to indicate that the worthwhile future in this business is coupled with immediate earnings for the right kind of man. One man with us has already made over a thousand sales on which his earnings ran from $5 to $60 per sale and more. A great deal of this business was repeat business. Yet he had never done anything like this before coming with us. That is the kind of opportunity this business offers. The fact that this business has attracted to it such business men as former bankers, executives of businesses —men who demand only the highest type of opportunity and income—gives a fairly good picture of the kind of business this is. Our door is open, however, to the young man looking for the right field in which to make his start and develop his future.

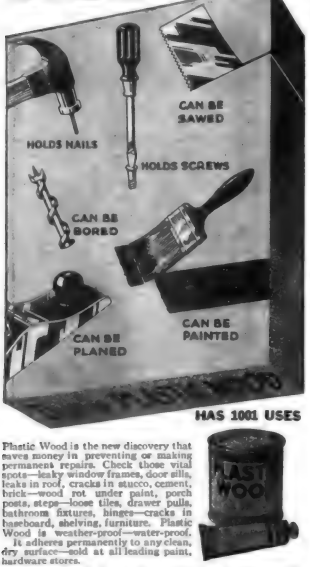
RUSH FOR EXCLUSIVE TERRITORY PROPOSITION

F. E. ARMSTRONG, Pres., Dept. 4019-B, Mobile, Ala.
Without obligation to me, send me full information on your proposition.

Name .....
Street or Route .....
Box No. .....
City .....
State .....

IN CANS **WOOD** IN TUBES

Handles Like Putty—Dries to Hard Wood



HAS 1001 USES

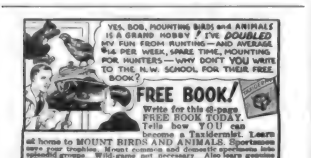
Plastic Wood is the new discovery that saves money in preventing or making permanent repairs. Check those vital spots—leaky window frames, door sills, leaks in roof, cracks in stucco, cement, brick—wood rot under paint, porch posts, steps—loose tiles, drawer pulls, bathroom fixtures, hinges—cracks in baseboard, shelving, furniture. Plastic Wood is weather-proof—water-proof.

It adheres permanently to any clean, dry surface—sold at all leading paint, hardware stores.

FREE Write The A. S. Boyle Company, Inc., 1934 Dana Avenue, Cincinnati, O., Department M. M.-2, for interesting booklet on the many uses of Plastic Wood.

PLASTIC WOOD

NRA



Learning Circus Stunts at College

(Continued from page 69)

interested in their work, however, spend two hours daily in rehearsals which are conducted in the gymnasium.

"One of the best wire walkers we ever had," Jackson said, "learned all the fundamentals in a week and by the end of the second week he could crawl through a hoop, undress and balance sitting on a chair on the wires."

Movies Show Performers' Faults

The coach has a novel and effective method of teaching his amateur aerialists. The instructor takes motion pictures of his advanced students and his beginners performing the same feats and upon developing and printing the films, makes them into "stick men" by drawing lines from points on the ear, shoulder, thigh, knee and ankle of the figures. He measures the angle of movement and then draws graphs for comparisons.

That many of the apparently more difficult feats seen in a circus may be learned by amateurs in a few weeks of practice is revealed by the records of some of these Illinois youths.

Hi Dahlke, a sophomore, who balanced on a rolling globe or large wooden ball, rolled it up and down an incline, while spinning a rope. Dahlke learned to balance on the globe in one semester, and learned to mount the incline while manipulating the hemp in a single evening.

Ad Bowman had been a ladder balancer for one season and then learned to walk his ladder up and down stairs in a week. Francis Preve learned to hang by his teeth in two months, and Bob Lorenz learned to spin a 60 foot rope after one season.

Safety Devices Used for Stunts

There has never been a serious accident in the 27 years' history of the circus. Accidents have been held to a minimum by the coach's strict requirements that safety devices be used in rehearsals and that prospective performers refrain from attempting difficult feats until they have mastered the fundamental principles of their acts.

For aerial acts, the performers are trained over a safety net and, before they are allowed to attempt any flying feats, they are taught to handle themselves properly in taking their falls into the net.

Acrobats learning somersaults and flip-flops, teeter-board performers, wirewalkers who attempt somersaults and jump objects, and those who perform on the Roman rings and perch poles are required to wear safety belts while mastering their feats. A safety belt is a heavy leather strap which is buckled around the waist. It has large harness rings sewed in each side, to which are attached ropes which lead to pulleys. The ropes are held by the instructor. When the performer makes a miscue, the instructor may take up the slack in the rope to leave the pupil suspended in midair, avoiding what might be a nasty tumble.

Thank You for Mentioning Modern Mechanix and Inventions for February When Writing to Advertisers

BOYS! THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.

THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls etc. Anyone can use it. **Never fails. A 64-page Book on Ventriloquism and the Ventrilo. All for 10c Postpaid.**

JOHNSON SMITH & CO. Dept. 619 RACINE, WIS.

LEARN TO DANCE AT HOME WITHOUT MUSIC OR A PARTNER

The book will teach you in a few hours—at home—in private—to learn as well as modern dancers! In fact you will soon shine on any floor. The Classic Dances, the Waltz, the One-Step, the Fox-Trot, etc.

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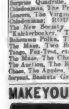

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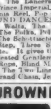

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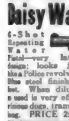

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If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

Coal Mines' Mechanical Watchdogs

(Continued from page 77)

United States in 1932, 1,168 miners met their death. This meant that for approximately every 304,000 tons of coal hoisted the lifeless body of a miner also was brought up from the bowels of the earth.

To safeguard the lives of its coal miners the federal government and various states in which large coal producing fields are located have marshaled to their aid the forces of modern science and mechanics. The United States Bureau of Mines operates 11 mine rescue stations and 10 mine rescue railroad cars throughout the mining fields of the country.

In addition to the United States Bureau of Mines rescue stations and cars, many of the states provide a similar service. The state of Illinois maintains 8 mine rescue stations in its mining fields.

The equipment with which each station is supplied includes: self contained oxygen breathing apparatus for each team member and for the superintendent with spare apparatus and parts; oxygen tanks; high pressure oxygen pump for charging apparatus oxygen bottles; oxygen inhalators, for reviving men overcome by gas or smoke; poisonous and explosive gas detectors; miners' safety lamps and electric lamps; and stretchers and first aid kits and supplies.

Two Types of Mine Explosions

There are two kinds of explosions, gas explosions and dust explosions. One of the most explosive of the gases in mines is methane or "marsh gas."

One of the instruments used to detect this gas is the Burrell gas indicator, which is so small that it may be carried in the hand. An electric spark generated within the instrument acts on a small sample of the gas which may be drawn into it, thus indicating the presence and explosiveness of the gas.

Although carbon monoxide gas is explosive when found in sufficient quantities it is known chiefly as a poisonous gas. It is the most poisonous gas found in coal mines. It is the same gas produced by the exhaust of automobiles. An indicator used to detect its presence is the pyrotannic acid indicator.

The various precautions taken to prevent gas explosions include: use of closed lights; the use of approved electrical equipment; use of government approved permissible explosives for blasting which produce a minimum amount of flame and strict compliance with the government laws relating to blasting; and finally the use of good ventilating systems to prevent the accumulation of gas.

There are many preventive measures against dust explosions. A system of rock-dust filled shelves placed in strategic positions throughout the mine and which collapse automatically when coal dust ignites in some way, as for instance by an explosion, is often used to prevent the spread throughout the entire mine of coal dust explosions. The coal dust also may be prevented from raising in clouds by a system of water sprays or by treating it with solution of calcium chloride.

Battle Rules 1935 Auto Models

(Continued from page 53)

is evinced by the 1934 sales, but they could not get used to the "bull nose." Therefore Chrysler decided that the lines should be refined and has reverted to a semblance of the conventional radiator grille.

Considerable attention is being given this year to the improving of braking systems. Studebaker introduces "compound hydraulic brakes," which provide larger pistons on the front shoes of each brake, producing a softer pedal for forward motion braking.

Hupmobile is laying stress upon its new power brakes, built by the maker of Steeldraulic brake equipment. Energy from the intake manifold is applied to the brakes in direct proportion to the pedal effort expended, giving a highly desirable graduated braking effect with feather touch control.

Trunks this year will be more plentiful, and distinctly of the streamline variety, blending into the body lines to such an extent as to be scarcely noticeable.

Concealed tires increase in popularity, with the tendency being toward complete removal of all accessories from the exterior, leaving a cleanly stream-lined body.

A very noticeable trend toward full three-passenger front seat width exists, with one manufacturer actually adding three inches to the seat width, and clearing the front compartment of gear shift and emergency brake levers.

How U. S. Navy Fights Battles at Sea

(Continued from page 44)

what a bombing plane could do to a battleship if her anti-aircraft defense were not on the job to repulse an aerial attack. We know about what a modern anti-aircraft battery would do to such a bomber if they got the first shot at him in any position within convenient bomb-dropping range. We would know what to expect if a fleet submarine succeeded in delivering an unseen torpedo attack against a light cruiser, and we know what would happen to the submarine if the cruiser launched an anti-submarine defensive before the sub could let go her torpedoes.

In maneuvers the participating ships are usually designated as the "Blue Fleet" and the "Black Fleet," or some other equally meaningless cognomen. It is like a game of checkers in which one player uses the white or red men and the other the black. Press reports of such naval activities often carry the statement that "The Blue Fleet met the Black Fleet, and the Black Fleet was *destroyed*." Such statements are never correct. The navy makes no such decisions and such statements are never given out to representatives of the press.

Gone are the days of naval warfare such as when the old U. S. S. *Constitution* sailed through the Straits of Gibraltar and challenged the Barbary pirates to come out and fight. The naval battle of the future, as maneuvers have revealed, will begin when the ships are from 200 to 500 miles apart. It will begin

(Continued on page 135)

New DRIVER 1935 Power Tools!

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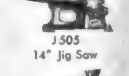

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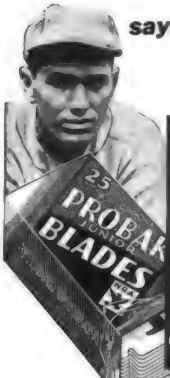

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Probak Junior is a product of Gillette and fits all Gillette and Probak razors

Hitch-Hiker's 2-Tube Portable Radio

(Continued from page 91)

plate. The opening may be covered with a grill cloth to protect the fragile speaker cone from injury.

Other coils, with fewer turns on both primary and tickler windings, may be wound to cover the different short wave bands. The number of turns is not very critical—a little experimentation will enable you to wind a coil for any desired short-wave band.

The midget speaker has a cone diameter of five inches, and will just fit into the shield can. For best results, it should be of the permanent magnet type, with a D.C. resistance of about 1000 ohms, and an impedance of 7000 ohms to match the recommended output load of the '33 power tube.

The potentiometer is a midget of 50,000 ohms maximum resistance. This instrument acts as a combined regeneration and volume control.

If desired, a 6-ohm variable resistor may be used in the positive filament lead of the '33 tube to give a better volume control, but this would necessarily entail further drilling of the panel and another control knob.

BLUEPRINTS for the Hitch Hiker's two-tube portable receiver, containing greatly enlarged diagrams, are available at 50c postpaid. Modern Mechanix Publishing Co., 529 S. 7th St., Minneapolis, Minn.

Card Tricks With Mark Twain Stack

(Continued from page 109)

On being asked to repeat this trick, it is well to vary the procedure a little. Instead of naming the bottom card of each pile, announce that you will give the sum of the numerical values of the first four cards of any pile.

For this trick let the summing up value of each face card equal ten. Selecting pile C from the first trick, we see from pile F that the sum of the first four cards is 28. One has only to run over the sequence for four cards, starting with the visible card, the 8, and add them up, counting the Queen as ten. Another example is shown in pile G.

The next trick is still more mystifying. The performer offers the Mark Twain stack to be cut; in reassembling the deck he casually notes the bottom card, then announces he can give the location of any card named by the spectators. A spectator asks for the King of Hearts, and the bottom card is the five of spades.

The performer instantly knows that the thirteenth card is the five of hearts, since corresponding numerical values are all 13 cards apart. Mentally he runs over the sequence to locate a king: five of hearts, nine of clubs, King of Diamonds. The fifteenth card (13 plus 2) is the King of Diamonds. The twenty-eighth card (15 plus 13) is the King of Spades; the forty-first card (28 plus 13) is the King of Hearts. Without doubt

(Continued on page 130)

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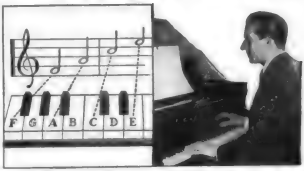

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Build This 110-Volt Lighting Plant

(Continued from page 105)

together all commutator segments. A heavy soldering iron or perhaps a blowtorch will be necessary here to get solder to adhere to the copper bars.

For rewinding the armature you will need one pound of No. 25 S.C.E. magnet wire, enough red rope paper (or similar insulation) to line the slots, two fiber laminations for the ends of the armature, 21 thin wedge sticks, and enough bakelite varnish to saturate the windings.

The gear end lamination is held in place by a fiber washer; loosen this, remove the old lamination, slip in the new one, and fasten in place with a piece of tape. Cut the other lamination into two parts, and shellac it in position on the commutator end.

Insulating strips for the slots should extend about ⅛" beyond each end of the armature core, and the same distance above the slots. Place one strip in each slot.

In beginning the winding, wrap about five inches of wire around the gear end of the shaft. Number each slot with crayon to correspond with the winding diagram.

Starting at the slot you have numbered 3, wind approximately 80 turns in slots 3 and 4. Pack the wires in carefully with a wood wedge stick after each dozen turns or so, without damaging the covering of the wires.

From slot 4 move to 2 and 5 and wind 80 turns. From slot 5 run the wire to 1 and 6 and place in 40 turns. This completes the winding for one of the four poles.

Repeat for the other three poles, following carefully the winding diagram. Bring the wire out from slot 21, allow about 4" for connections, then cut off.

Cut off the insulating paper flush with the armature laminations, bend it over the windings in each slot, then force the wedges into the slots.

A test set consisting of headphones and a flashlight cell in series, or a 20-watt bulb in series with your 110-volt power line, will be suitable. Connect one test prong to the armature shaft, the other to one end of the winding. A click will be heard in the phones, or

(Continued on page 131)

Turntable for 00 Gauge Railroad

(Continued from page 103)

with one-inch throw is set on the shaft of the small pinion, and the large gear is nailed to the bridge frame.

The crossing gates are made to operate in pairs from a single lever. Rails must be raised slightly to allow clearance for the crank bar, which is bent from ⅛" galvanized wire. The weighted lever at one end of the crank bar holds the gates in either the up or down position.

No problems should be encountered in making the manual semaphore whose construction is shown in Fig. 14. A section of wood dowel, mounted in a base block, has pivoted at its upper end a semaphore arm cut from light-gauge galvanized iron.

Thank You for Mentioning Modern Mechanix and Inventions for February When Writing to Advertisers

Riding 2000 Miles in a Bike Race

(Continued from page 49)

size causing the elimination of the old type high wheeler in the six-day races.

The first six-day races were run with one-man teams, but in 1899 the two-man team was introduced. Lately the three-man team has been introduced. This innovation assures the spectators of more speed and thrills during the race. The point system was established in 1916.

With the introduction of the point system came the sprints for points. In modern six-day races, it is customary to stage four series of sprints daily, except on the final day of the race. The distance of each sprint is two miles, or twenty laps, with ten sprints to a series. The scoring of points for each sprint follows: Six points to the winning team, four points to the second team, two points to the third and one point to the fourth.

Point System Decides Winner

On the final day of the race, the morning and afternoon sprints are conducted at the same time, but the scoring is changed to 12 points for the winning team, while second, third and fourth positions are scored the same as on other days. During the last hour of the race it is customary to hold a sprint every mile to the finish with the winning teams scoring 72 points. The second, third and fourth places again remain the same.

The purpose of the point system is simple enough. When two or more teams may be tied in mileage and laps at the conclusion of the race, their final position in the race is determined by the number of points each won during the week's sprints.

The average race will go 2,200 miles. In Chicago, the riders are taken off the track four hours during the morning to permit cleaning and repairing the track. At Madison Square Garden in New York, the race is continuous. Considering that the average race consumed 123 hours, the average speed of the riders will run close to 16 miles an hour.

Riders Gain Weight in Race

In the heat of jamming, the average rider can attain a speed of 35 to 40 miles an hour. During routine riding the field maintains an average speed of about 10 miles an hour.

An interesting sidelight on six-day racing is the conduct of the rider during a race, what he eats and how much he rests. The average rider eats from four to five times a day and from three to four times as much as the average person. This is due to the constancy of the work and the necessity for replacing burned up energy. Some of the riders actually gain weight during the progress of a race.

A necessary qualification for the successful rider is the ability to relax and sleep on a moment's notice. During a period of jamming the relief shifts follow rapidly in succession. However, during the day, when the race is quiet, one member of a team can rest for two or three hours while his partner remains on the track.

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Learn Sportsmen's Trapping Secrets

(Continued from page 81)

wire is attached, the loop being arranged under it and over the trail. When captured, the animal will dislodge the cross-piece between the stubs and will be carried up.

Often in the course of a freshet or winter thaw a stream will be covered with a foot or more of water over the old or original ice. The water will freeze over to the extent of one or more inches, while the water underneath, between the first ice and the new or top ice, will flow away. This leaves a space between the old ice and the new which is known as drum-ice. Few trappers are aware of the value of this passage or space under the ice-roof. A mink will often follow a stream in the space between the two layers of ice, providing the trapper with a good runway.

A section of ice is removed in a likely place near the bank with as much care as possible. Here, with ice pieces or thick crusted snow, a den is made having three sides, the fourth being arranged for an entrance, as shown in Fig. 8. A fish can be used as bait.

The making of bait dens and cubby houses

(Continued on page 142)

Proper Methods of Curving Skis

(Continued from page 82)

wax, and pass the ski over the heat so that it will melt into the pores of the wood.

After going over the ski once, let it remain by the heat a while and then repeat the performance. Then the ski will not pick up the snow, but will slide smoothly over the surface.

During thawing weather and on moist snow, it is especially necessary to keep the ski well waxed. Many skis are ruined because they are not waxed during wet weather.

Where skiing is done in hill country where skiers desire to ski up-hill, the following trick is useful. Cut a two-foot length of undressed deer or calf-skin, trim it to the width of the ski, and tack it to the under surface. The skin selected should be from the under side of the hide where the hair is soft.

To prevent the forward part of the skin from turning back or scuffing up, tack a bit of tin over the forward edge. Going up-hill, the hair flattens down, and there is no definite slide-back owing to the fact that the hair pushes up to hold the ski in place.

Where the snow is soft, skis generally sink deep enough in the snow to cover the foot, and a hard lump gathers under the sole. A housing for the foot can readily be made, to aid in keeping the snow out, by tacking denim or some other hard material around the foot rest and straps and sewing it along the side.

The housing should reach almost up to the knee. After the foot is inserted into the strap, it is pulled up the leg where it is either tied or pinned to the trouser. There should be enough play within the housing to prevent leg and foot cramp.

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Around the World on Airways of Sea

(Continued from page 38)

equipment, radio beacons, and improved landing fields and facilities, there will, in my opinion, be an 8 to 10 hour regular transcontinental service available within the next three or four years, and in addition the planes operating on this service will be equipped as Pullman sleepers.

As further proof of the rapid advancement of commercial aviation toward the goal of around-the-world airlines, let us take a glimpse at what happened in the 11,323 mile MacRobertson race—the greatest one in the history of aviation—from London to Melbourne, Australia. It is true our British cousins, C. W. A. Scott and C. Black, were the winners and we offer them our heartiest congratulations on their success. However, their plane, a twin-engine De Haviland Comet, was a specially built speed plane.

American Plane's Feat in Race

They made the trip in 70 hours, 54 minutes, 18 seconds elapsed time, averaging 159.1 miles an hour, making six stops enroute, which is in itself a marvelous record.

Second to arrive at Melbourne was the Royal Dutch Airlines Douglas transport ship powered with two Wright Cyclone engines, piloted by K. D. Parmentier and J. J. Moll, carrying three passengers with a crew of two as well as 30,000 air mail letters.

While it took Parmentier 90 hours, 17 minutes and 30 seconds to reach Melbourne, or approximately 19 hours longer than the winner, he made sixteen stops enroute and flew over a route some 1,000 miles longer than that flown by Scott and Black.

The American team, Roscoe Turner and Clyde Pangborn, flying a Pratt & Whitney Wasp-powered Boeing 247-D transport ship, which is being run in regular transport service by United Air Lines, Inc., arrived third in the race—2 hours and 44 minutes after the Dutch ship. They, too, took a much longer route than the winners.

Picks Route Across Pacific

No wonder that the British aviation experts, while thrilled with the success of Scott and Black, were the first to acknowledge that the flights of the two American-built and powered transports were more significant commercially than the flight of the winner.

Hardly had our interest waned over the results of the MacRobertson race when we learned that our good friend, Sir Charles Kingsford-Smith, the first man to fly the Pacific east and west, and one of the pioneer pilots of the world, with his co-pilot and navigator, Captain P. G. Taylor, successfully made a 7,365 mile jaunt from Brisbane, Australia, to Oakland, California.

What kind of a plane was Sir Charles using? Nothing else but an American-made Lockheed Altair model which he called "Lady Southern Cross."

In the future, I believe we will concede to Sir Charles the credit for proving that Hawaii is the landing field between America and Asia.

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Utilize Idle Space Under Your Roof

(Continued from page 113)

dormer roofed with the same pitch as the rest of the house is consistent, sometimes the low ridge rather compels a flat roofed dormer, as in Fig. 5. If this style is built, allow at least a 2-inch dead air space just beneath the dormer roof, and packed with a good insulating material.

One unusual and distinctive type of dormer is shown in Fig. 5. With glass on three sides, the effect is attractive from the outside and permits of a clever interior arrangement.

The usual attic can be converted into one large room or two or more smaller rooms. Usually, the first reason for finishing off the attic is to provide another bedroom for a growing family. You will find the space just as well suited for a study or for a playroom for the youngsters.

As for heating in winter, one of the best methods is to run hot water pipes up between the walls from the furnace and connect them to a radiator on the top floor. If only a single radiator is to be used, the original hot water tank coil in the furnace should suffice. By installing another coil in the firebox, however, two or more radiators can be kept hot enough to make your new attic rooms cozily comfortable.

The installation of a single register in the floor is often used; if the furnace is of the single pipe type and the register placed directly above, this may do.

Card Tricks With Mark Twain Stack

(Continued from page 122)

some spectator will request you to repeat this trick. This time someone in the audience is asked to designate a card by its location in the deck, let us say the seventeenth card. Knowing, for example, that the five of spades is on the bottom, the performer computes the seventeenth card to be the eight of hearts.

The performer proceeds to force the spectators to name this seventeenth card by subtle elimination. The following conversation best exemplifies the system.

Performer—"As you all know, there are four suits in the pack, hearts, diamonds, clubs and spades. Mr. Brown, will you please name two of those suits?"

Mr. Brown—"Hearts and Diamonds."

Performer—"Thank you. Now, Miss Smith, will you please name one of those suits?"

Miss Smith—"Diamonds."

Performer—"Thank you. Now that leaves us the hearts. We have found that the seventeenth card is a heart."

The reader will see from the foregoing how subtly heart was "forced." If Mr. Brown had named clubs and spades, then the performer would have said: "Very good. That leaves us hearts and diamonds. Miss Smith, please name one of those." If Miss Smith names hearts, the performer responds: "Thank you. Now you have jointly decided that the seventeenth card is a heart." The next thing is

Card Tricks With Mark Twain Stack

to find the denomination of the heart by similar elimination.

Performer—"There are thirteen hearts in the deck. There are those above seven and below seven. Which do you say, Mr. Green, above or below?"

Mr. Green—"Below."

Performer—"Very good. That leaves us the cards above seven—the eight, nine, ten, Jack, Queen, King. Miss White will you please name three of those?"

Miss White—"Eight, nine and ten."

Performer—"Mr. Brown, please name two of those numbers."

Mr. Brown—"Eight and ten."

Performer—"Thank you. Miss Smith, please name one of those."

Miss Smith—"Eight."

Performer—"Thank you one and all. By some peculiar mental reaction relevant to mass psychology, you yourselves have designated the seventeenth card as the *eight of hearts*. Will one of you please break the seal and count off seventeen cards?"

Build This 110-Volt Lighting Plant

(Continued from page 124)

the bulb will light, if there is a ground. Should a ground be indicated, unwind turns with the test prongs still connected until the ground has cleared. If you have never wound an armature before, it will be advisable to make this ground test after completing each coil.

Now your armature is complete except for varnishing. Place it in a large pan, then pour on all the bakelite varnish it will absorb. Place in a moderately hot oven and let it bake until the varnish becomes cherry red.

Disconnect the field coil leads from the brushes and remove the grounded and movable brushes. Insert a new brush in the remaining brush holder and connect to the cut-out terminal post to complete your alternator.

The 6-volt auto generator serving as exciter goes to the alternator field coil leads. The 110-volt current comes from the frame of the generator and the terminal post.

The alternator must be driven at around 2000 r.p.m. to deliver 110 volts. A 1-h.p. gasoline engine is large enough.

A 4-inch pulley is used on the exciter, and it is driven by the same belt, since it will have to put out only about 3 amperes.

Most builders will prefer a rheostat rather than one of the expensive automatic regulators for controlling the output of the plant. A 50-ohm, 200-watt capacity unit connected in series with the alternator output should be adjusted to operate the radio with two 60-watt lights turned on. The radio can now be turned off without harming the lights. Never turn off the lights when the radio is on without first adjusting the rheostat. The voltage of the generator rises so high when part of its load is removed that the radio set might be damaged.

The alternator will work in either direction, but the exciter must run counter-clockwise as you face the commutator.

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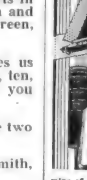

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What Oil Is Best for My Car?

(Continued from page 65)

vapors, condensing on the cold cylinder walls on the intake stroke, dilute oil adhering to the walls. This thinned oil, being dragged back into the crankcase on succeeding strokes of the piston, gradually thins out the lubricant.

The *Pyroil* method of lubrication protects the motorist who wishes to get more miles on one crankcase filling of oil, as well as the driver who forgets to check his oil. *Pyroil* has saved motorists from many a burned-out bearing. It provides lubrication when fast hot weather driving thins and breaks down the regular oil film of a bearing.

The value of *Pyroil* as a protective lubricant in emergencies has been demonstrated by the "dry-run" tests. Before official witnesses at Winona, Minnesota, Pilot Gerald Kohner flew a *Pyroil-treated* Spartan plane for 35 minutes with no oil in the crankcase. At Rochester, New York, a *Pyroil-treated* automobile ran 922 miles across country without crankcase oil.

A few general tips as to the grade of oil best suited for a particular car will prove opportune here. In order to keep down gasoline consumption and give greater speed, the motorist should use as light an oil as will give safe, dependable lubrication.

Heavy grades of oil will last longer, in general, and will deaden somewhat the pounding of bearings in a worn engine.

No. 50 oil is the heaviest recommended for motor cars, and this should only be used on long summer drives. No. 20 is a good grade for ordinary winter driving, but the thinner No. 10 grade is used by many motorists who do only city driving at comparatively slow speeds.

The correct winter oil can be determined by testing the stiffness of the motor when starting on a cold morning. A half-pint or pint of kerosene may be added to the oil safely from time to time as a thinner if the car is used only for short trips. Kerosene will evaporate on long drives and the oil must be checked frequently.

Microscope Reveals Snow's Beauty

(Continued from page 41)

To do this, remove the black card from in front of the microscope objective, for ten seconds, replace it, then replace the black plate holder slide.

As in any other form of photography, the length of exposure must be determined by practice. Dark days require a longer exposure than do bright ones—up to as much as 60 seconds.

Everyone has noticed the delicate tracery of fern leaf or other fantastical design worked by frost forming on a window pane. Beautiful portraits of these complicated crystal patterns may easily be secured at your leisure merely by rigging up a shelf support for the microscope and camera. Frost crystals will remain for hours if the day is quite cold; the element of hurry is absent here.

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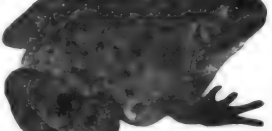

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INVENTORS

SEE PAGE 12

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Projects of Uncle Sam's 49th State

(Continued from page 61)

gradual slope of the east side. It is estimated that 2,000,000 tons of sand and 1,000,000 barrels of bulk cement will be required to supply the necessary concrete.

To be certain that the dam would withstand the tremendous pressure and not develop under-leaks, $180,000 was spent testing the limestone bottom on which the dam rests to locate pockets in the sub-strata. Huge blocks of the limestone, some three feet in diameter and forty feet long, were lifted from the ground at regular intervals and examined for weak seams that might endanger the dam. This process is called "grouting."

When a seam was found, engineers plotted its course on a profile map, flushed it out with a stream of water, and pressure filled it with a neat cement mixture. All grouting holes are filled by the same method.

Wheeler dam, 230 miles downstream, located at the head of the slack water impounded by the Wilson dam at Muscle Shoals, is known as a "run of the river" dam.

More than a mile long, 6,336 feet to be exact, Wheeler dam will cost $20,000,000. Its length places it amongst the leaders in gravity type construction.

Unlike the swinging buckets at Norris dam, Wheeler dam is being built from floating barges. Refined sand is transported up the river by a fleet of thirty barges and it is unloaded directly onto 40 by 90 foot barges carrying the mixers and bucket cranes for unloading mixed cement.

With the sudden conflux of laborers into the valley, the government was faced with housing them at a price consistent with their earning power. The city of Norris was the result.

Norris is America's attempt at Utopia.

Into the perfectly planned city are set 250 modern houses. They have hand-hewn shingles, sun-rooms, sleeping porches, and all types of electrical equipment. The lots, ½ of an acre each, are landscaped, with plenty of provision for garden space. The rent ranges from $14 a month for a three-room house to $40 for a seven-room house.

How U. S. Navy Fights Battles at Sea

(Continued from page 121)

in the air when some flying officer finds and reports the enemy forces by radio. Within a very short time after such an aerial discovery is made the air over the sea will be a seething maelstrom of fighting airplanes. One force or the other will be defeated in the aerial battle.

The tremendous range of modern naval guns—anything up to 37,000 yards—is wholly dependent upon the aerial spotting of shells upon the targets. Consequently the naval force that loses its air service in the preliminary aerial skirmish between battle fleets will be at a tremendous disadvantage. The side with even 50 per cent of its air service still in action will be able to stand off at maximum gun ranges pouring shells into the enemy ships.

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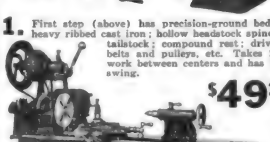

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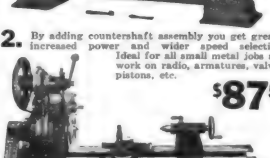

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Science Finds New Way to Remove Germ Cause and Activate Dormant Roots to Grow New Hair

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A germ called "Flask Bacilla of Unna" gets deep into the scalp skin in many cases of abnormal hair deficiency, causing a most dangerous type of dandruff. It clogs up pores and hair follicles, causing itchy scalp, falling hair, and prevents dormant hair roots (papilla) from growing new hair. The germ is seldom suspected. Washing and shampooing and use of tonics, ointments and lotions don't remove the cause. They merely rinse and treat the surface and roll off the outer skin like water rolls off the back of a duck. No wonder baldness is increasing.

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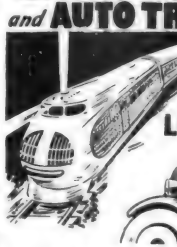

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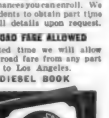

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Fortunes in Needed Inventions

(Continued from page 93)

a young baby to kick itself out from under the covers on a cold winter night. Zipper garments do not appear to fill the bill.

A top for collapsible toothpaste tubes that will replace the ordinary screw cap, automatically snapping shut when not in use, would prove convenient.

A simple metal expanding gate that can be quickly placed in any doorway to prevent the passage of small children or creeping babies would be very popular with mothers.

A clothes pin made from stainless steel that would hold in a windstorm would make a veritable fortune for its inventor.

A pressed metal gadget through which an ear of corn could be forced to relieve it of its kernels would be popular with housewives.

A holder for a French phone that will leave both hands free while talking will sell for a dollar, and many thousands would be bought by business men. An elementary idea on this order was worked out by an English woman, and is shown on page 86 of this issue.

A detachable coffee pot handle that can be quickly and easily attached and removed when the coffee pot is placed on a hot gas stove will preserve the handle and at the same time prevent burnt fingers.

An automatic or self-measuring flour sifter that will measure out either full or half cups would save soiling dishes and would be a great help to the housewife. At least 1,000,000 of these articles could be sold in a year.

Mothers want a kiddie-car on which the height of the seat could be adjusted above the wheels to accommodate a growing child.

Cottage dwellers need a simple metal attachment, a brace that could be used to hold up long spans of stovepipe without having to wire the pipe to the ceiling.

Learn Sportsmen's Trapping Secrets

(Continued from page 126)

along streams is an interesting one in winter trapping. Fig. 9 shows another method of making a house along the same lines. It may be made up near the roots of a tree or on a bank of pieces of thin ice or thick crusted snow.

Mink have runways under the banks along the streams which they often use, especially when the streams are open. Doing so they lay themselves open to being taken by the expert trapper. Examination of a trail will show where a stick lies naturally over the trail and over which the mink will inevitably leap, alighting on either side of the stick each time at approximately the same spot. This at once clears the way for the set as illustrated in Fig. 7. It simply involves noting where the feet of the mink land and scooping out a place at that point, putting a trap there.

In Fig. 10 is shown a set that likewise comes under the classification of deadly ones. Here is shown a tree fallen down over a stream. This set involves tacking a rabbit down by its feet out on the tree, and placing a trap in front of it.

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Photo courtesy Burlington R. R.

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INVENTORS

SEE PAGE 12

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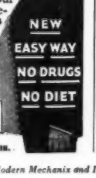

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The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. "On a test I gained an average of 4 miles on a gallon," writes Alex Wertz. "Vacu-matic is the best I have ever tried." Clarence Rutzin—"I now tried the Vacu-matic on several tests and find that I get between 5 and 6 miles per gallon increase, have more mileage, have greater pickup."

Free Details

Learn about this remarkable device that so greatly affects the entire performance of your motor. Learn why your car is costing you extra money to operate without VACU-MATIC. See why your VACU-MATIC equipped car will leap away from traffic without sputter or hesitation. Discover a new driving thrill and enjoy the savings. Get the facts! Write today!

Agents and Salesmen

If you are interested in earning unusual profits, check coupon. Exclusive territories are now being granted.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and welded into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

The VACU-MATIC Co., Wauwatosa, Wis.

FREE OFFER COUPON

THE VACU-MATIC COMPANY
7617-71 W. State St., Wauwatosa, Wis.
Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

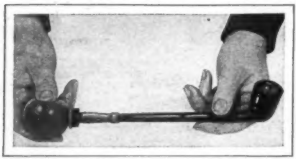
Name.....

Address.....

City..... State.....

☐ Check here if interested in selling proposition.

NEW IDEAS SPUR BUSINESS PROGRESS



Designed to break in new pipes and sweeten old ones, bulb "smokes" pipe, forcing smoke through discharge tube.

A new type thermostat has been developed that controls inside temperature through variance in outside conditions. The thermostat is placed outside of the building and allows for sun heat, wind velocity and outside temperatures. It automatically regulates the furnace to the heating speed desired.

Waterproof adhesive tape has recently been perfected to a point where it is not only a first aid dressing, but can also be used in repair work to be covered by a coat of paint.

Beverage manufacturers, in order to avoid imitations, are now imbedding coins in the bases of bottles to insure the fact that the bottle will be broken when the liquid is consumed. The value of the coin is added to the purchase price.

A new flashlight that is said to throw a light beam a mile comes in two sections. Using one section, the light has the ordinary five cell flashlight range. Addition of the extra section adds five cell power to the light.

A new coaster wagon for children boasts rubber tires, stream-lined chassis, and a set of headlights controlled from a battery in the front end.

An absorbent, wedge shaped container for beverage glasses soaks up the "sweat" and prevents soiling of table covers.

A tire for winter driving has built-up rubber cleats that make driving without chains possible, and reduces skidding to a minimum.

Transoms become burglar-proof with the invention of a new lift that operates on a worm-gear fastened near the transom. It is operated from below by a small crank. The worm-gear locks in any set position.

A folding picnic table, carried like a suitcase, opens to reveal four seats on alternate corners. It is constructed of light wood, weighing 25 pounds, and stands solidly on uneven ground.

A new mixer is not dependent upon the shape of the bowl for successful mixing. It is held flat in any type receptacle and, instead of cutting, is said to roll the mass, carrying air into the mixture each time it rotates. A special guard on top prevents splashing.

All-wave filters are now said to work with the same maximum efficiency on the short-wave band. Filter coils and condensers are set in a small metal box which connects between a light socket and the attachment plug of the set to eliminate all background noises, especially those due to line conditions.

Photo shows a sanding device designed to eliminate sudden skidding on wet and icy streets. The hopper replaces the front car bumper and automatically drops a small quantity of sand before the wheels with the application of the brakes.

A new graphite gun works by hand pressure applied to an air bulb beneath the nozzle. It facilitates the application of dry graphite in places where liquid lubricants are impractical, on office equipment, window slides, and on the moving parts of all wooden implements.

The vented tire tube has channels moulded in to permit the escape of air compressed between tube and casing, eliminating, thereby, blowouts due to air blisters.

Community antennas are made practical by the multiple outlet system. A small outlet unit, attached to each set, makes it possible for two radios to operate, using the same antenna.